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**1. CONCEPT OF THE PROGRAM**

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| **University Mission** | Generation of new competencies, preparation of a leader who translates research and entrepreneurial thinking and culture |
| **University values** | * Openness – open to change, innovation and cooperation.
* Creativity - generates ideas, develops them and turns them into values.
* Academic freedom - free to choose, develop and act.
* Partnership – builds trust and support in relationships where everyone wins.
* Social responsibility - ready to fulfill obligations, make decisions and be responsible for their results.
 |
| **Graduate Model** | * Deep subject knowledge, its application and constant expansion in professional activity.
* Information and digital literacy and mobility in a rapidly changing
* environment.
* Research skills, creativity and emotional intelligence.
* Entrepreneurship, independence and responsibility for their activities

and well-being.* Global and national citizenship, tolerance for cultures and languages.
 |
| **The uniqueness of the EP** | • Focus on the labor market of pharmaceutical production. The educational program includes an additional educational program (Minor) (minor) - a set of disciplines and (or) modules and other types of educational work, determined by the student in order to form additional competencies.• Formation of an objective ideological view of the surrounding reality, providing conditions for acquiring a general intellectual level and basic knowledge. |
| **Academic Integrity and Ethics Policy** | The university has taken measures to maintain academic honesty and academic freedom, protection from any kind of intolerance and discrimination:• Rules of academic integrity (protocol of the Academic Council No. 3 dated October 30, 2018);• Anti-corruption standard (Order No. 373 n/k dated December 27, 2019).* Code ofEthics (Protocol ofthe Academic Council No. 8 datedJanuary 31, 2020).
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| **Legal framework for the development of EP** | 1. Law of the Republic of Kazakhstan "On Education";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 with amendments and additions dated December 29, 2021 No. 6143. 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;4. Rules for organizing the educational process on credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152;5. Qualification directory of 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. 553.6. Guidelines for the use of ECTS.7. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the director of the Central Library and Medical Academy No. 45 o / d dated June 30, 2021 |
| **Organization of the educational process** | • Implementation oftheprinciplesofthe Bologna Process• Student-centeredlearning• Availability• Inclusiveness |
| **EP qualityassurance** | • Internal quality assurance system• Involvement of stakeholders in the development of the EP and its evaluation• Systematic monitoring• Updating content (updating) |
| **EntryRequirements** | Established in accordance with the Model Rules for Admission to Education in Educational Organizations Implementing Educational Programs of Higher and Postgraduate Education Order of the Ministry of Education and Science of the Republic of Kazakhstan № 600 of 10.31.2018 |

1. **1. OP's PASSPORT**

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| **Purpose of EP** | **•** preparation of demanded bachelors in the field of pharmaceutical production, focused on the labor market. |
|  **EP tasks** | **•** formation of socially responsible behavior in society, understanding the importance of professional ethical standards and following these standards;• providing basic bachelor's training, allowing them to continue their education throughout their lives, to successfully adapt to changing conditions throughout their professional career;**•** providing conditions for acquiring a high general intellectual level of development, mastering literate and developed speech, a culture of thinking and the skills of scientific organization of labor in the field of chemical and pharmaceutical technology;**•** creation of conditions for intellectual, physical, spiritual, aesthetic development to ensure the possibility of their employment in their specialty or continuing education at subsequent levels of education. |
| **EP harmonization** | • providing Level 6 of the National Qualifications Framework of the Republic of Kazakhstan;• Dublin Descriptors;• 1st cycle of the Qualification Framework of the European Higher Education Area (A Framework for Qualification of the European Higher Education Area);• Level 6 of the European Qualification Framework for Lifelong Learning. |
| **EP connection with the professional sphere****Name of the degree awarded** | •"Chemical production" approvedbyprotocols of the meeting of branchcommissionsfor social partnership and regulationof social and laborrelationsforthemining, chemical, construction and derovoobrabatyvayuschey, light industry and mechanicalengineeringfromthe August 16, 2016 №1. •The professional standard is “Pharmaceutical Activities” - a technologist for the industrial production of drugs. Organization and implementation of the manufacture of drugs in the conditions of industrial production and quality control of drugs, dated October 22, 2018 No. 285.After the successful completion of this EP, the graduate is awarded Bachelor of engineeering and technology in the educational in training program 6V07270- «Pharmaceutical Production Technology» |
| **List of qualifications and positions** | •a technologist, chemist-technologist;•marketerofpharmaceuticalproduction;•managerofpharmaceuticalproduction;•mastertechnologist in thechemical-pharmaceutical, chemicalindustry;•junior researcher in research institutions without making requirements for work experience. |
| **Sphere of professional activity** | •pharmaceuticalfieldofproductionofmedicines;•biotechnologicalproduction;•technicalcontroldepartments; •centralfactorylaboratories; •laboratoriesforstandardizationandqualitycontrolofmedicines. |
| **Objects of professional activity** | •chemical and pharmaceutical enterprises;•enterprises for the production of medicines;•biotechnological production;•technical control departments;•central factory laboratories;• laboratories for standardization and quality control of medicines. |
| **Subjects of professional activity** | •drugs;•devices and equipment for chemical and pharmaceutical technology; •machines and machines for filling and packaging dosage forms; •medical preparations and medical products, various types of raw materials and auxiliary materials and substances (including vegetable raw materials), chemical reagents and reagents;• research instruments and equipment. |
| **Types of professional activity** | • organizationalandmanagerial;•productionandtechnological;• designandengineering;• experimental research; (pedagogical). |
| **Learning Outcomes** | **LO1** Demonstrate the application of social, natural-scientific, socio-economic and environmental knowledge in personal and professional activities;**LO2** Communicate freely in a professional environment and society in Kazakh, Russian and Englishlanguages, taking into account the principles of academic writing, a culture of academic honesty;**LO3** Demonstrate natural science, mathematical, engineering knowledge, possess information and computational literacy, the ability to generalize, analyze and perceive information, set a goal and choose ways to achieve it, master the methods of mathematical data processing, methods of scientific and experimental research, regulatory documents and elements of economic analysis;**LO4** Use the skills of logical, analytical and conceptual thinking in the field of industrial production of medicines;**LO5** Realize of organization and control the technological process of production of medicines, medical devices, as well as conduct marketing research in the pharmaceutical market;**LO6** Design pharmaceutical production with the choice of a rational technological scheme of production and instrumentation of processes with the calculation of the main and auxiliary equipments;**LO7** To analyze medicines, raw materials and excipients in accordance with regulatory and technical documentation; to work with regulatory and technical documentation, scientific and educational literature; to use modern problems of standardization and certification of medicines; to ensure and comply with the conditions of occupational health and safety and industrial sanitation and hygiene, to conduct marketing research on the pharmaceutical market; alternative energy sources;**LO8** Develop technologies for medicines and extractive preparations using biopharmaceutical and bioengineering fundamentals;**LO9** Develop technologies and methods for quality control of natural and synthetic medicines, taking into account the patterns of the relationship between the structure of medicinal substances and their physical and chemical properties;**LO10** Formulate goals, plan and carry out research work using modern scientific research in the field of pharmaceutical production of drugs;**LO11** Propose principles for constructing technological schemes for pharmaceutical production in the creation of waste-free and environmentally friendly technologies, to carry out certification and licensing of medicines, medical products;**LO12** Carryout the manufacture of medicines in industrial production conditions with good manufacturing practices (GMP) and compliance with health and safety conditions. |

**3. COMPETENCES OF THE EP GRADUATE**

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| **GENERALCOMPETENCE**(SOFTSKILLS).Behavioral skills and personality traits |
| GC1.Competence in managing one's own literacy | GC 1.1. The ability to self-learn, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment.OK1.2. Ability to express thoughts, feelings, facts and opinions in the professional field.OK1.3. Ability for mobility in the modern world and critical thinking. |
| GC 2. Languagecompetence | GC2.1.The abilitytobuildcommunicationprograms in thestate, Russian and foreign languages.GC2.2.The ability for interpersonal social and professional communication in conditions of intercultural communication. |
| GC 3. Mathematical and Science Competence | GC3.1.The abilityandwillingnesstoapplytheeducational potential, experienceand personal qualitiesacquiredduringthestudyofmathematical, naturalscience, technicaldisciplinesattheuniversitytosolve professional problems. |
| GC 4. Digital competence, technological literacy | GC 4.1. The ability to demonstrate and develop information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and professional activities.GC4.2.The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information. |
| GC 5. Personal, social and academic competencies | GC5.1.The ability for physical self-improvement and focus on a healthy life to ensure a full-fledged social and professional activity through the methods and means of physical culture.GC5.2.The ability to socio-cultural development based on the manifestation of citizenship and morality.GC5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success.GC 5.4. The ability to successfully interact in a variety of socio-cultural contexts at school, at work, at home and at leisure. |
| GC 6. Entrepreneurialcompetence | GC 6.1. Abilitytobecreativeandentrepreneurial in a varietyofenvironments.GC6.2. The abilitytowork in a modeofuncertaintyandrapidlychangingtaskconditions, makedecisions, allocateresourcesand manage your time.GC 6.3. Abilitytoworkwithconsumerrequests. |
| GC 7. Cultural awareness and ability to express yourself | GC 7.1. The abilitytoshowworldview, civilandmoralpositions.GC7.2. The abilitytobe tolerant ofthetraditionsandcultureofotherpeoplesoftheworld, tohave high spiritual qualities. |
| **PROFESSIONAL COMPETENCES**(HARDSKILLS).  |
| Theoretical knowledge and practical skills specific to this area | PC 1. The ability to use the acquired fundamental knowledge of the theory of language and speech communication, literary criticism, integrating modern approaches to the study of the functioning and development of language and literature, in practical activities. |
| PC 2. The ability to transform and create oral and written business, media, information, scientific texts, taking into account the norms of the literary language and stylistic norms. |
| PC 3. The ability to explain the mechanisms and patterns of the historical development and functioning of the language, sociolinguistic and psycholinguistic factors. |
| PC 4. The ability to demonstrate an understanding of the patterns of the literary process, the artistic significance of a literary work in connection with the social situation and culture of the era; |
| PC 5. The ability to carry out linguistic and comparative analysis of language units at all levels of the language system, comparative historical and typological analysis of a work of art. |
| PC 6. The ability to use the system of philological knowledge in order to effectively solve teaching, educational and methodological tasks. |

**3.1 Matrix of correlating the learning outcomes of the EP in general with the formed competencies**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **LО1** | **LО2** | **LО3** | **LО4** | **LО5** | **LО6** | **LО7** | **LО8** | **LО9** | **LО10** | **LО11** | **LО12** |
| КК1 | + |  |  |  | + | + |  |  | + | + |  | + |
| КК2 | + |  |  |  |  |  |  |  | + | + |  |  |
| КК3 |  | + | + |  |  | + |  |  |  | + | + |  |
| КК4 |  |  | + | + | + |  | + |  |  |  |  |  |
| КК5 |  |  |  | + | + | + | + | + | + | + |  | + |
| КК6 |  | + |  |  |  |  |  | + | + |  | + |  |
| КК7 |  |  |  |  |  |  | + | + | + |  |  | + |
| КК8 |  |  | + | + | + | + | + |  | + | + | + | + |
| ПК1 |  |  |  |  | + | + |  | + |  | + |  |  |
| ПК2 |  |  |  | + |  | + |  |  |  | + |  |  |
| ПК3 |  |  |  |  | + |  |  |  | + | + |  | + |
| ПК4 |  | + |  |  |  | + | + | + |  |  |  |  |
| ПК5 |  | + |  |  |  |  |  | + | + |  |  |  |

**4 MATRIX OF THE INFLUENCE OF DISCIPLINES ON FORMATION OF LEARNING OUTCOMES AND INFORMATION ON LABOR INTENSITY**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Module name** | **cycle** | **component** | **Name of the discipline** | **Brief course description** | **Number of credits** | **Formed learning outcomes (codes)** |
| **РО****1** | **РО****2** | **РО****3** | **РО****4** | **РО****5** | **РО****6** | **РО****7** | **РО****8** | **РО****9** | **РО****10** | **РО****11** | **РО****12** |
| Module of the social science | GED | ОC | History of Kazakhstan | The purpose of the discipline isformation of an objective idea of the history of Kazakhstan based on a deep understanding and scientific analysis of the main stages, patterns and originality of the historical development of Kazakhstan. Ancient people and the formation of nomadic civilization. Turkic civilization and the great steppe. Kazakh Khanate. Kazakhstan in the era of modern times. Kazakhstan as part of the Soviet administrative-command system. Declaration of Independence of Kazakhstan.State system, socio-political development, foreign policy and international relations of the Republic of Kazakhstan. Methods and techniques of historical description for the analysis of the causes and consequences of events in the history of Kazakhstan. |  5 | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |  |  |
| GED | ОC | Philosophy | The basics of the emergence of philosophy are examined, the features of the emergence of a culture of thinking are revealed, the concepts of “philosophy”, “worldview”, the essence and content of the concepts of “being,” “consciousness” are revealed. The relationship between the concepts of “knowledge” and “creativity” is considered, the essence and content of the category of the philosophy of freedom are revealed. They develop skills for identifying the essence of the philosophical problem, critical thinking, skills for studying philosophical aspects, problems of practice and cognition. |  5 | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |  |  |
| Module of socio- political knowledge | GED | ОC | Social and Political studies | Studies the theory of sociology, structure and stratification of society, explains the role and place of politics in society, examines the stages of formation and development of political science, including youth policy, the role of politics in the system of public life, reveals the essence of the state, reveals the relationship between the state and civil society. Skills of sociological research, analysis of socio-political information are developed. |  4 |  | **ѵ** | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |
| GED | ОC | Cultural Studies and Psychology | Understanding the socio-ethical values of society as a product of integration processes in the systems of basic knowledge of the disciplines of the socio-cultural-psychological module; analyze the features of psychological institutions in the context of their role in the modernization of Kazakhstani society; formulate programs for solving conflict situations in society, including in professional socium; be able to correctly express and defend their own opinion of social importance. |  4 | **ѵ** | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |  |
|  | GED | HSC | Ecosystem and law | Formation of integrated knowledge in the field of economics, law, anti-corruption culture, ecology and life safety, entrepreneurship, scientific research methods.Fundamentals of safe human-nature interaction, ecosystem and biosphere productivity. The entrepreneurial activity of society in conditions of limited resources, increasing the competitiveness of business and the national economy. Regulation of relations in the field of ecology and human life safety. Knowledge and compliance of Kazakhstan’s law, obligations and guarantees of subjects, state regulation of public relations to ensure social progress. Application of scientific research methods. |  5 |  |  | **ѵ** |  |  |  |  |  |  |  |  |  |
| Socio-ethnic development Module | BD | EC | Abay Study | Study of the historical, cultural and literary context of the Abay era; biography and creative heritage of Abai; works of Abai in Kazakh and Russian languages; history of formation and development of Abay Studies; works of Abay scholars. Analysis of literary works within the framework of the evolution of artistic consciousness, from the point of view of culture and socio-historical experience. The place and role of Abay''s lyrical poetry in the education of young people in the spirit of humanism. Abay''s commandment to young people. |  3 | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |  |  |
| BD | EC | Actual Problems and the Modernization of Public Consciousness | Topical issues of Environmental Protection, quality of education, strengthening the role of religion, agriculture, the state language, preserving the national culture, and its own national code are explained. The analysis of the establishment of the values of modern Kazakhstan society will be carried out, the directions of modernization of public consciousness will be determined: the formation of the national basis of the identity of Kazakhstanis, the correct scientific and educational base, participation in the modernization of public consciousness on the basis of sincerity and pragmatism. | ѵ | ѵ |  | ѵ |  |  |  |  |  |  |  |  |
|  ВD | ЕC | Mukhtar Study | Studies the life and work of M. O. Auezov, analyzes the writer's creative laboratory, his biography in the context of his work, as the creator of science Abay; researcher zhyr "Manas". Acquaintance with M.Auezov as a prominent public figure. The skills of analyzing the literary heritage of M. Auezov in world and eastern literature are being developed. Feelings of patriotism and love for the country are instilled. | ѵ | ѵ |  | ѵ |  |  |  |  |  |  |  |  |
| Communi0mber of creditse bachelor in Odustryанный язык о0ысын табу buckwheat grainscation and Physical Training module | GED | ОC | Kazakh (Russian) language | Development of cognitive and communicative activities in the Russian (Kazakh) language in the areas of interpersonal, social, intercultural communication. Instilling the skills of discussing ethical, cultural, socially significant norms in discussions, ability to work in a team, teamwork, flexibility, creativity. Development of practical skills for interpreting text information, explaining their stylistic, genre specificity in various areas of communication. |  10 | ѵ | ѵ | ѵ |  |  |  |  |  |  |  |  |  |
| GED | ОC | Foreign language | It studies new information obtained from a scientific text in a foreign language. Examines the role of the proposal in a foreign text and methods of development of information in the text. Basic and additional information in the text. Structural and semantic analysis of scientific texts and translations. Annotation. Annotation of the scientific text. Review and review. Text review. Development of communication skills and speech skills. |  10 |  | ѵ | ѵ |  |  |  |  |  |  |  |  |  |
| GED | ОC | Physical Training | Forms the social and personal competencies of students, ensuring the targeted use of appropriate means of physical culture and sports for the preservation, promotion of health and preparation for professional activities. It provides students with an understanding and acceptance of the social role and values ​​of physical culture in the professional and personal formation of the future specialist. Development of skills for a healthy lifestyle, methods of physical improvement of the body. |  8 | ѵ |  | ѵ |  |  |  |  |  |  |  |  |  |
| BD | HSC | Professional Kazakh (Russian) language | The skills of extracting the necessary information from the text and its tolerance in educational and professional communication are formed. The ability to establish contacts at a professional level and to organize communications on the basis of the objectives and situation of communication is being developed. Creativity, innovation, collegiality and the defence of one’s point of view are fostered in the process of building a programme of speech behaviour in Russian (Kazakh) in the sphere of professional communication. |  3 | ѵ | ѵ |  | ѵ |  |  |  |  |  |  |  |  |
| BD | HSC | Professionally-Oriented Foreign Language | Compliance with the A1 level on the pan-European competence scale is cognitive and communicative competences. Compliance with the A2 level on the European scale of competences - cognitive, socio-cultural and communicative competences. Compliance with the B1 level on the pan-European competence scale is linguo-culturological, socio-cult urological, cognitive, communicative competences. Compliance with level B2 of the European scale of competences - linguistic-cultural, socio-cultural, cognitive, communicative competences. |  3 | ѵ | ѵ |  | ѵ |  |  |  |  |  |  |  |  |
| GED | ОC | Information and Communication Technologies (in English) | Knowledge of computer systems, software. Development of skills in the use of information resources for searching and storing information, working with spreadsheets. The use of methods and means of information protection; design and creation of websites, multimedia presentations. Skills of using e-government and e-books, various cloud mobile technologists, SMART technology management.  |  5 |  | ѵ | ѵ |  |  |  |  |  |  |  |  |  |
| Fundamentals of Engineering and Technical Seiences Module | BD | HSC | Higher Mathematics  | The elements of linear algebra and analytic geometry are considered. Develop the ability to calculate the limit function. The acquisition of knowledge of the differential and integral calculus of a function of one variable. Knowledge of the concepts of functions of several variables. Argumentation of the optimal solution of differential equations. Skills of finding multiple integrals. Acquisition of theoretical knowledge on the theory of numerical, functional and power series and their convergence. |  5 |  |  |  |  |  |  |  |  |  | ѵ  |  |  |
| BD | HSC | Physics | Statistical and thermodynamic methods of investigation, fundamentals of molecular kinetic theory, thermodynamic parameters, gas laws, entropy of open nonlinear system, self-organizing systems are considered. General characteristics of transport phenomena, oscillations and properties of electromagnetic waves and processes are studied. The skills to solve generic problems from different sections are being developed. |  4 |  |  |  | **ѵ** |  |  |  |  |  |  |  |  |
| BD | EC | Applied Mechanics | He studies theoretical mechanics: axioms of statics, equilibrium conditions, kinematics of a point, kinematics of a solid body, complex motion of a point, dynamics of a material point, general dynamics theorems, dynamics of a rigid body. Strength of materials. Apply skills to the basic laws and equations of statics and dynamics. To be able to apply the processes of change and energy conversion in mechanical systems. |  4 |  |  | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |
| BD | EC | Mathematical Modeling of Chemical and Technological Processes | Considers the basic concepts of mathematical modeling of chemical-technological processes, basic terminology.A theoretical method for constructing a model of a chemical-technological process, a computer mathematics system.He studies mathematical models of chemical-technological processes on the basis of solving nonlinear algebraic equations and systems, differential equations.Processing of the experiment and statistical modeling in chemical technology. |  |  |  | **ѵ** |  |  | **ѵ** |  |  |  |  |  |  |
|  | BD | HSC | Engineering Computer Graphics | Considers the main positions of descriptive geometry, engineering graphics, the practical implementation of general technical and specialized drawings in accordance with GOST. It instills skills in working with modern computer programs in the AutoCAD computer-aided design environment, 3D modeling; reading technical drawings. |  4 |  |  | **ѵ** |  |  |  |  |  |  |  |  |  |
| Module of Chemical Engineering | BD | HSC | General Chemistry | It studies the basic concepts and laws of chemistry; the structure of substances; classes of inorganic compounds; redox reactions; characteristics, extraction and application of hydrogen, carbon, silicon, nitrogen, phosphorus, oxygen, metal oxides and nonmetals, etc. Develops skills and abilities to solve problems, create and conduct experiments, formulate conclusions individually and as a team member. |  4 |  |  | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |
| BD | HSC | Educational Practice | Acquaintance with the pharmaceutical enterprise, its structural divisions. With the device of the tablet shop, ampoule shop, complex pharmaceutical preparations shop, phytochemical products shop, packing shop and personnel functions. Ability to use regulatory documents and scientific literature in the preparation of the report. Have skills in preparing reporting documentation. Delivery of the report. |  2 |  |  |  | **ѵ** | **ѵ** |  | **ѵ** |  | **ѵ** |  |  |  |
| BD | EC | Analytical Chemistry | Examines the basics and methods of chemical and FHMA, metrological processing of the results of chemical analysis, sampling and sample preparation. Types of chemical reactions. Ability to use methods of detection, separation, separation and concentration. Master the methods of qualitative and quantitative analysis in the manufacture of medicines. Have the skills to analyze drugs on modern equipment. |  5 |  |  |  | **ѵ** |  |  | **ѵ** |  |  |  |  |  |
| BD | EC | Qualitative and Quantative Analysis | Qualitative analysis, basic principles, reactions in qualitative analysis, fractional and system analysis. Macro, semi-micro, micro, ultramicro analysis. Laboratory equipment in a qualitative analysis. Separation of ions into groups. tasks of quantitative analysis, classification of methods: gravimetric and titrimetric analyzes. |  |  |  | **ѵ** |  |  | **ѵ** |  |  |  |  |  |
|  | BD | EC | Physico Chemical recearch Analysis | Considers the theoretical foundations of physical and physico-chemical methods of analysis, the significance of these methods and their advantages over chemical methods. Electrochemical. optical methods based on the interaction of the part with magnetic fields. Chromatographic methods. Possession of methods of static processing of analysis results. |  5 |  |  | ѵ | ѵ |  |  | ѵ |  |  |  |  |  |
| BD | EC | Modern Methods of Analysis | It studies the relationship between composition and societies of equilibrium systems. Considers the various properties of complex systems to determine their composition. Determination of the concentration of substances of the order of 10-5-10-10 mol / l. mass spectrometric analysis, radiochemical methods, resonance methods (NMR, EPR and others) |  |  |  | ѵ | ѵ |  |  | ѵ |  |  |  |  |  |
| BD | EC | Organic Chemistry I | Studies the theoretical foundations of organic chemistry. The composition and structure of organic compounds. The ability to classify organic compounds. Homology, isomerism, mechanism of organic reactions. Preparation methods and chemical properties. Analyze the structure of substances on the basis of elemental analysis, spectroscopic and chromatographic identification methods. Have the skills to calculate the ratio of reagents, theoretical and practical yields of reaction products. |  4 |  |  |  | ѵ |  |  |  |  | ѵ |  |  |  |
| BD | EC | Selected Chapters of Organic Chemistry | Studies the physical and chemical patterns of typical technological processes. Heterogeneous technological processes, their classification. Technological systems in pharmaceutical industries. Structure, analysis, synthesis of technological systems. To be able to carry out the calculation of the basic kinetic parameters, apply mathematical methods, have the skill in solving typical professional problems. |  |  |  | ѵ |  |  | ѵ |  | ѵ |  |  |  |
| BD | EC | Organic Chemistry II | Considers aromatics and classification. Receipt and chemical properties of aromatic compounds mechanism. Functional derivatives of aromatic compounds. The ability to analyze the results in the synthesis of organic compounds with desired properties and have the skills to analyze experimental data, substantiate and draw conclusions, work individually and in a team. |  5 |  |  |  | ѵ |  |  |  |  | ѵ |  |  |  |
|  | BD | EC | Chemistry of Cyclic Compounds | Considers the classification of heterocyclic compounds, industrial, laboratory methods of obtaining, the chemical properties of five-membered heterocyclic compounds. Independently use special literature, be able to apply professional knowledge in further education and in the manufacturing sector. Have the skills to perform basic chemical analysis operations, solve problems, conduct experiments. |  |  |  |  | **ѵ** |  |  | **ѵ** |  |  |  |  |  |
| BD | EC | Biochemistry | Studies the chemical composition of living systems of all levels of organization, chemical processes. Considers static and dynamic biochemistry, studies the chemical composition of tissues. Metabolism. Be able to explore the transformations of substances in the body. Have the skills of acquiring new achievements of scientific biochemistry and their prospects. |  5 |  |  |  | **ѵ** |  |  | **ѵ** | **ѵ** |  |  |  |  |
| BD | EC | Biotechnology | Examines biotechnology and its importance for pharmaceutical science and practice. Bioobjects as a means of producing medicinal, preventive and diagnostic means. Biotechnology in solving environmental problems. Have the skill, ability to apply and compare new technologies based on cultivated tissues and cells of plants, animals and microorganisms with traditional methods. |  |  |  |  |  |  |  | **ѵ** |  | **ѵ** |  |  |
| BD | EC | Physical and Colloid Chemistry | Considers the processes of physical chemistry. The ability to formulate the first and second laws of thermodynamics. The concept of dispersed systems, the factors of their stability and stabilization, solubilization, the concept of high-molecular substances (WWII). Surface phenomena: hydrophilicity and hydrophobicity, surface-active substances. Formulate the processes of diffusion, types of diffusion. Have the skills to analyze experimental data, substantiate and draw conclusions. |  5 |  |  |  | **ѵ** |  |  |  |  |  |  |  |  |
|  | BD | EC | Colloid Chemistry | Have a notion about disperse systems, colloid, emulsion, suspension systems, factors of their stability and stabilization; concept of high-molecular substances (WWII), Surface phenomena: surface-active substances, the orientation of molecules in the surface layer, adsorption on the surface of a solid-liquid and liquid-liquid; adsorption, ion exchange. To be able to calculate diffusion. Have the skills to analyze experimental data, to draw conclusions. |  |  |  |  | ѵ |  |  | ѵ |  | ѵ |  |  |  |
|  | BD | EC | General Chemical Technology | Studies the theoretical foundations of chemical technology. The main laws of homogeneous and heterogeneous processes. Features of catalytic processes, factors limiting chemical-technological processes. Methods of chemical technology, synthesis and analysis of chemical-technological systems. Have the skills to calculate and analyze the material and heat balances of chemical and technological processes; To be able to analyze the models and technological relations of the СHTS. |  4 |  |  |  | ѵ | ѵ |  |  |  |  |  | ѵ |  |
| BD | EC | Regularities of Technological Processes | Studies the physical and chemical patterns of typical technological processes. Heterogeneous technological processes, their classification. Technological systems in pharmaceutical industries. Structure, analysis, synthesis of technological systems. To be able to carry out the calculation of the basic kinetic parameters, apply mathematical methods, have the skill in solving typical professional problems. |  |  |  |  |  |  |  |  |  | ѵ |  |  |
| BD | EC | Processes and Devices of Chemical and Pharmaceutical Production | Studies the theoretical foundations of the processes of pharmaceutical production. Hydromechanical and mechanical processes. Thermal processes. Heat transfer. Classification of heat exchange equipment. Mass transfer processes. Classification and general characteristics of mass transfer processes. To be able to classify typical technological processes and devices; apply theoretical bases of processes for analysis. Have the skills to calculate and design the basic apparatus of pharmaceutical production. |  6 |  |  | ѵ |  |  | ѵ |  |  | ѵ |  |  |  |
| General Chemical Technology |  |  | Innovative equipment for pharmaceutical production | Consider classification and consept of technology of medications, basic technologies and equipment for receiving solid, soft, gaseous dosage forms. The innovative equipment of the leading pharmaceutical machine-building companies, as well as modern global trends in this area are presented. Mastering methods on modern analytical equipment used to control the quality of raw materials, intermediate materials and finished product. The main aspects of GMP standards, modern informative technologies are considered. |  |  |  |  |  | ѵ |  |  | ѵ |  |  |  |
| BD | EC | Engineering Economics and Entrepreneur-ship | Considers the features of the content of entrepreneurship in a particular field of activity. Introduces the features of state regulation of business activities. Develops skills for creating and registering your own business, developing founding documents, business strategies, and business plans. Ability to form business ideas, risk management, evaluation and analysis of the effectiveness of business activities in a particular area or sector of the economy. |  4 |  |  | ѵ |  |  |  |  |  |  |  |  | ѵ |
| BD | EC | Organization of Production and Management | Studies the organization of production and management. Considers the content and distinctive features of the organization of technological production and management in market economy conditions. The role of production management and management in the intensification of the pharmaceutical industry. Basics of marketing activities. Marketing activities in the pharmaceutical market. Ability to analyze marketing situations. Forms planning skills and analysis of marketing activities. |  |  | ѵ |  |  |  |  |  |  |  |  |  |
| BD | HSC | Standartization, Certification and Metrology | Knowledge and understanding of the system of technical regulation, standardization, ensuring the uniformity of measurements, legislative and regulatory documents, types and categories of standards. The ability to analyze compliance with the requirements for standardization, certification, metrological norms and rules of market entities. To evaluate the economic efficiency of work on interstate and international standardization, certification, and metrology. |  4 |  |  |  |  |  |  | **ѵ** |  |  |  |  |  |
| Fundamentals of SpecialityModule | BD | EC | Introduction to the Specialty | Considers the basic concepts of the subject. A brief historical sketch of the development of the technology of medicinal forms. Lists of drugs. Apply the processes underlying the manufacture of medicines (grinding, dissolving, filtering, sterilization, etc.) the equipment used. Generates skills in the processes used in the manufacture of drugs. |  4 |  |  |  | **ѵ** | **ѵ** |  |  |  |  |  |  |  |
|  ВD |  ЕC | Basics of Academic Writing  | Considers the problem of forming students' academic literacy and teaching writing from the standpoint of theory and practice. Recommendations for the preparation, writing and publication of scientific texts, reports, essays, analytical reviews, glossaries, abstracts. reports, scientific articles, course and diploma works. Inoculates the skills of speaking at conferences, meetings, etc. |  |  | **ѵ** | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |
| BD | EC | Pharmaceutical Chemistry | Examines the current state, the main directions and development prospects. The main directions of the creation of medicines. The objectives of pharmaceutical chemistry in the development of research methods and quality assessment of drugs. Pharmaceutical analysis methods. Sources, methods of obtaining drugs. The ability to organize, design, plan, equip chemical-pharmaceutical production. Skills have in the production process. | 6 |  |  |  | **ѵ** | **ѵ** |  |  |  |  |  |  |  |
| BD | EC | Selected Chapters Pharmaceutical Chemistry  | Considers the sources and methods of obtaining drugs. Regulatory documentation and standardization of drugs. Standard samples and their use in pharmaceutical analysis. Quality control of drugs in production. The study of the shelf life of drugs. Chemical authentication methods. Conduct will able to step wise quality control of drugs. |  |  |  |  | **ѵ** |  | **ѵ** |  |  | **ѵ** |  |  |
| ChD | EC | The Basics of Pharmaceutical Technology | Studies basic concepts and terms: technology, pharmacological and medicinal products, medicinal substance, medicinal plant materials, medicinal form, medicinal product.State regulation of the production of medicines. Classification of dosage forms. Auxiliary substances in the technology of dosage forms. Nomenclature of medicinal substances. The ability to classify dosage forms. Have the skills to distinguish the range of medicinal substances. |  8 |  |  |  |  | **ѵ** |  | **ѵ** |  |  |  |  |  |
| ChD | EC | Drug Forms Technology | It studies toxic and potent substances. Excipients. Stabilizers of medicinal substances and dosage forms. Preservatives, prolongators, solubilizers, corrigentov, etc. Stages of the technology of powders of liquid and soft dosage forms. Liniment, ointment, suppositories. Dosage forms for injection. Solvents for injection dosage forms. To be able to classify dosage forms. Have the skills to distinguish the range of medicinal substances. |  |  |  | **ѵ** | **ѵ** |  | **ѵ** |  |  |  |  |  |
|  BD | EC | Fundamentals of design and production equipment  | Examines the main directions of technical progress and the general provisions of the design of the enterprise of pharmaceutical production. The nomenclature of the main types of enterprises of pharmaceutical production. The ability to systematize the basic concepts of the structural elements of industrial buildings. Instill skills in the development of pharmaceutical production projects and their equipment. |  4 |  |  | **ѵ** |  |  | **ѵ** |  |  |  |  |  |  |
|  BD | EC | Fundamentals of pharmaceutical enterprise design | Studies general provisions on the design of industrial pharmaceutical facilities, the main regulatory documents governing the design work. Possess skills in the design stages of pharmaceutical production, the purpose and content of the technical project. To be able to use programs of optimal design of pharmaceutical industries. |  |  |  | **ѵ** |  |  | **ѵ** |  |  |  |  |  |  |
| ChD | HSC | IndustrialPractice І | Have an idea about the organizational structure of pharmaceutical enterprises, the storage conditions of raw materials and finished products (of a specific drug). To be able to conduct a risk analysis, storage conditions of raw materials and finished products. To possess the skills of preparing reporting documentation and presentation for protection. |  4 |  |  |  |  | **ѵ** | **ѵ** | **ѵ** |  |  |  |  | **ѵ** |
| Fundamentals of Scientific Research | ChD | EC | Planing and Statemthent of Scientific Research Works | Examines the basics of the formulation and execution of research. Research Planning. Methods of performing research. Physico-chemical research methods, instrumental measurement methods. Processing of research results and their interpretation. Have the skills to calculate the measurement error. To determine the experimental error, the reliability of the research results. To be able to apply the methods of physical, mathematical and computer modeling. |  7 |  |  | **ѵ** |  |  |  |  |  |  | **ѵ** |  | **ѵ** |
| ChD | EC | Fundamentals of scientific research and patenting | Studying goal setting research. Have the skills of patent search, drafting a patent application. Works with scientific literature, search, accumulation and processing of scientific information. Methodology of physical and chemical research and scientific and technical creativity. The ability to systematize the results of patent, literary search and experimental data. The directions of scientific research and the choice of skills to assess the relevance of the research topic. |  |  | **ѵ** |  |  |  |  |  |  | **ѵ** |  | **ѵ** |
| ChD | HSC | Practical Training for Students ІI | To be able to analyze the material balance and technical and economic indicators of a specific production process, calculate the consumption rates of raw materials and auxiliary materials.Have skills in managing processes, machines and devices. Select the technological equipment with the given performance of a particular extraction preparation, a complex pharmaceutical preparation. To possess the skills of preparing reporting documentation and presentation for protection. |  6 |  |  |  |  | **ѵ** | **ѵ** |  |  |  | **ѵ** |  | **ѵ** |
| Technology of medicine substances module | ChD | EC | Extraction technology preparatov | Studies the main trends in the development of pharmaceutical production. Industrial Regulations Alcoholimetry Flavor and medicinal syrups. The theoretical basis of drying, extraction, obtaining drugs biogenic stimulants. Features of technology, purification and release of individual substances. To be able to manage the technological process of production of finished pharmaceutical products and to possess the skills of carrying out the technological process of production of extraction preparations. |  7 |  |  |  |  | **ѵ** |  |  | **ѵ** |  |  |  |  |
| ChD | EC | Theoretical basis of the production of drugs biogenic stimulants  | Considers the theoretical basis of obtaining drugs biogenic stimulants. Maximum purified preparations from vegetable raw materials. Methods of primary and deep cleaning of hoods. The ability to clean and release individual substances using a special technology. Preparations from animal raw materials. Enzyme preparations of microbiological production. To possess the skills of carrying out the technological process of production of biogenic stimulants. |  |  |  |  |  |  |  | **ѵ** |  |  |  | ѵ |
| BD | EC | Technology of Natural Medicine Substances | Considers the principles of classification of biologically active compounds. Phytochemistry of medicinal plants. Classification and nomenclature of natural medicines. Phytochemical analysis of raw materials, dosage forms. Technology of production and chemical properties of medicinal natural substances. To be able to isolate and analyze the phytochemical production dosage forms. Skills of modeling chemical-technological processes in the production of drugs from plants. |  7 |  |  |  |  | **ѵ** |  |  |  | ѵ |  |  |  |
| BD | EC | Chemistry of Natural Medicine Substances | Considers the classification of biologically active compounds. Standardization of medicinal plant materials. Phytochemistry of medicinal plants. Classification and nomenclature of natural medicines. Phytochemical analysis of raw materials, individual biologically active substances, dosage forms, Be able to carry out phytochemical analysis of natural substances. Have the skill of collecting and storing plant materials. |  |  |  |  |  |  | ѵ |  | ѵ |  |  |  |
| ChD | EC | Chemistry and Technology of Synthetic Drugs | Examines the classification and nomenclature of synthetic drugs. The main directions of the search for synthetic drugs. Chemistry and technology of medicinal inorganic and organic products. To be able to identify the relationship of chemical structure and pharmacological activity. Industrial production methods. Pharmaceutical control of drug production. Have the skill to synthesize and analyze synthetic drugs. |  6 |  |  |  |  | **ѵ** |  |  |  | ѵ |  |  |  |
|  | ChD | EC | Classification of synthetic medicines | Examines the classification and nomenclature of synthetic drugs. The main directions of the search for synthetic drugs. Be able to apply the requirements of the rules of good manufacturing practice (MRA) to the production and quality control of medicines. Drug standardization and metrology. To be able to carry out a rational selection of synthetic drugs and auxiliary substances. |  |  |  |  |  | ѵ |  |  |  | ѵ |  |  |  |
| ChD | EC | Nanotech-nology in the creation of polymer dosage forms | Considers the main tasks of nanotechnology, the identification of chemical, mechanical, physical laws for the purpose of using them in the production of drugs. Improving the methods of making medicines; creation of methods for the production of drugs, taking into account related sciences. Search for new excipients, make them more effective with a minimum of side effects, study the stability of drugs and establish their shelf life; studying the effectiveness of technological processes for the production of such funds. |  6 |  |  |  |  |  |  |  |  | ѵ | ѵ |  | ѵ |
| ChD | EC | Polymers in Pharmacy and Medicine | The use of polymeric substances in pharmacy, their physicochemical properties and use in various dosage forms: in solid dosage forms as coatings to eliminate unpleasant taste, deodorization, protection from moisture, air oxygen, regulation of the duration of drug action, as a dispersion medium in production liquid dosage forms. Water-soluble polymers that act as thickeners, stabilizers, emulsifiers, dispersants, solubilizers. |  |  |  |  |  |  |  |  | ѵ | ѵ |  | ѵ |
| ChD | EC | Technology of finished dosage biopharmacy | Studies the organization and implementation of the technological process of production of finished medicines and semi-finished products. Tablet machines, the principle of their work, the coating of tablets with shells. The technological process of production of aerosols. Special requirements for the production of ampoule solutions. Biopharmacy as a scientific direction of drug technology. To be able to analyze the production processes of biopharmaceutical drugs and master the skills of researching new drugs. |  8 |  |  |  |  | **ѵ** |  | **ѵ** |  |  |  |  |  |
|  | ChD | EC | Biopharmaceutical Analysis of Finished Medicines | Studies biopharmaceutical analysis, as a scientific direction of drug technology. The influence of pharmaceutical factors on the therapeutic, the effectiveness of drugs. Bioavailability of drugs in the experiments "invitro" and "invivo". Biopharmaceutical analysis of finished drugs. To be able to analyze the production processes of biopharmaceutical drugs and master the skills of analyzing biopharmaceutical drugs. |  |  |  |  | **ѵ** |  | **ѵ** |  |  |  |  |  |
| Module of new professional competencies acquisition | BD | EC | Subjects on the additional educational program | Developing students skills in creating low-waste and non-waste technologies with the organization of resource-saving processes in production and the ability to apply them in professional activities. |  12 |  |  |  |  |  |  | **ѵ** |  |  | **ѵ** |  |  |
| Module of final certification | ChD | EC | Pre-degree or Industrial Practice | Studies the structure and range of products. General and special requirements for labor protection, safety engineering and industrial sanitation. The device and the principle of operation of the main apparatus and machines in the production of preformed tablets, ampulirovannyh, galenovyh drugs. To be able to work with regulatory and technical documentation, scientific literature. To possess the skills of preparing reporting documentation and presentation for protection. |  8 |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  |  |  | **ѵ** |
|  |  | Writing and defece of degree work, (project) or passing a comprehensive exam | Demonstrates independent performance of analytical review and patent search; setting research objectives; experimental (design) technological part; calculations of the studied process and economic evaluation of the research results; the discussion of the results; demonstration of knowledge of life safety and industrial sanitation and hygiene, the ability to make a motivated objective and complete expert opinion. Ability to issue a thesis project, with the required structure. |  12 |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **v** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |

**5 SUMMARY TABLE SHOWING THE VOLUME OF DISPUTED LOANS BY EP MODULES**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Course of Study | Semester | The number of mastered modules | The number of studied disciplines | Number of KZ credits  | Total hours | Total KZ credits | The number of |
| ОC | HSC | EC | Theoretical training | Physical culture | Educational practice | Industrial practice | Final examination | exam | Differen-tialtest |
| 1 | 1 | 5 | 5 | 2 | 0 | 28 | 2 |  |  |  | 900 | 30 | 6 | 1 |
| 2 | 4 | 4 | 2 | 2 | 26 | 2 | 2 |  |  | 900 | 30 | 5 | 3 |
| 2 | 3 | 5 | 3 | 3 | 2 | 28 | 2 |  |  |  | 900 | 30 | 6 | 2 |
| 4 | 3 | 1 | 2 | 4 | 24 | 2 |  | 4 |  | 900 | 30 | 5 | 2 |
| 3 | 5 | 4 | 0 | 1 | 5 | 30 |  |  |  |  | 900 | 30 | 4 | 2 |
| 6 | 4 | 0 | 1 | 3 | 24 |  |  | 6 |  | 900 | 30 | 3 | 1 |
| 4 | 7 | 2 | 0 | 0 | 3 | 20 |  |  |  |  | 600 | 20 | 3 | 0 |
| 8 | 1 | 0 | 0 | 3 | 20 |  |  |  |  | 600 | 20 | 3 | 0 |
| 9 |  |  |  |  |  |  |  | 8 | 12 | 600 | 20 | 0 | 1 |
| total | 28 | 13 | 11 | 22 | 200 | 8 | 2 | 18 | 12 | 7200 | 240 | 34 | 12 |

**6 STRATEGIES AND METHODS OF TRAINING, MONITORING AND EVALUATION**

|  |  |
| --- | --- |
| **Learning Strategies** | **Student-centered learning:** the learner is the center of teaching/learning and an active participant in the learning and decision-making process.**Practice-oriented learning:** focus on the development of practical skills. |
| **Teachingmethods** | Conducting lectures, seminars, various types of practices:• application of innovative technologies:• problem learning;• case study;• work in a group and creative groups;• discussions and dialogues, intellectual games, competitions, quizzes;• methods of reflection, projects, benchmarking;• Bloom's taxonomy;* • presentations;
* • rational andcreativeuseofinformationsources:
* • multimediaeducationalprograms;
* • electronic textbooks;
* • digital resources.
* Organization of independent work of students, individual consultations.
 |
| **Monitoring and assessing the achievability of learning outcomes** | **Current control** on each topic of the discipline, control of knowledge in classroom and extracurricular activities (*according to the syllabus*). Assessment Forms:* survey in the classroom;
* testing on the topics of the academic discipline;
* test papers;
* protection of independent works;
* discussions;
* trainings;
* colloquia;
* essays, etc.

**Midterm control** at least two times during one academic period within the same academic discipline.**Intermediate certification** is carried out in accordance with the working curriculum, academic calendar.Conduct forms:* exam in the form of testing;
* oral exam;
* a written exam;
* combined exam;
* protection of practice reports.

**Final certification.** |

**7 EDUCATIONAL AND RESOURCE SUPPORT OF THE EP**

|  |  |
| --- | --- |
| **InformationResourceCenter** | The structure of the EIC includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the EIC is 180 computers with Internet access, 110 workstations, 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 scanners of A-4 format and 3. The software of the EIC is AIBS "IRBIS-64" under MS Windows ( basic set of 6 modules), stand-alone server for uninterrupted operation in the IRBIS system.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.Thematic databases of their own generation have been created: "Almamater", "Proceedings of SKSU scientists", "Electronic archive". Online access from any device in 24/7 mode via the external link http://articles.ukgu.kz/ru/pps.Working with catalogs in electronic form. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKSU", "Rare Books", "Electronic Fund", "SKSU in Print", "Readers" "SKU".The JIC 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/.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-kіtаp", "Kitаp.кz", etc.For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users. |
| **Material and technical base** | - Laboratory Technology of pharmaceutical production; - Laboratory of Pharmaceutical Chemistry and Chemistry of natural compounds;- Research laboratory; - IRLIP KBM Laboratory;- SAPA Laboratory;- An audience with an interactive whiteboard. |

Ф.7.02-09

**AGREEMENT SHEET**

according to the educational program 6B07270 - "Technology of pharmaceutical production"

Director DAV\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Naukenova A.S.

Director DAN \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Nazarbek U.B.

Director DP and C \_\_\_\_\_\_\_\_\_\_\_\_\_ Bazhirov T.C.