

The catalog of elective disciplines

1. Department: "Hygiene and epidemiology"

2. Level of preparation (bachelor / internship / magistracy / residency)

3. Specialty: "Technology of pharmaceutical production"

4. Course: 1

5. The name of the elective discipline: "Ecology and sustainable development"

6. Number of credits - 5

7. Objective: to form an ecological outlook, to gain deep system knowledge and to have an idea about the basics of the sustainable development of society and nature, theoretical and practical knowledge on modern approaches to the rational use of natural resources and environmental protection.

8. Tasks:

- to acquaint students with the problems of modern civilization;
- to study the basic zakomernosti functioning of living organisms, ecosystems of various organizations, the biosphere as a whole and their sustainability;
- to generate knowledge about the environmental consequences of human activities in conditions of intensified environmental management;
- to form students' complex objective and creative approach to discussing the most acute and complex problems of environmental protection and sustainable development.

9. The rationale for the choice of discipline: modern civilization is under threat and requires the solution of a number of global environmental problems arising from anthropogenic influences. When using natural resources, a person has a certain negative impact on the environment. At the same time, not only the quality of environmental objects, but also the conditions of human life and his health change. In this regard, education in the field of environmental protection, ecology and sustainable development should be necessary in the development of the professional activity of a pharmaceutical production technologist.

10. Learning outcomes (competencies):

Knowledge (cognitive sphere)	Skills and abilities (psychomotor sphere)	Personal and professional competencies (relationships)
- knows the basic concepts and tasks of ecology and sustainable development; - knows the basic laws that determine the interaction of living organisms with the environment; - knows the distribution and dynamics of the number of organisms, the structure of communities and their dynamics; - knows the patterns of energy flow through living systems and the circulation of substances, the functioning of ecological systems and the biosphere as a whole; - knows the basic principles of nature conservation and rational nature management; - knows the social and environmental consequences of human activities; - knows the concept, strategies, problems of sustainable development and practical	- able to analyze natural and anthropogenic ecological processes and possible ways of their regulation; - able to understand modern concepts and strategies for the sustainable development of mankind, aimed at systematically changing the traditional forms of economic management and lifestyle of people in order to maintain the stability of the biosphere and the development of society without catastrophic crises; - knows how to use the knowledge gained about the patterns of interaction between living organisms and the environment in practical activities to maintain sustainable development;	- collects materials on environmental issues and sustainable development, rational use of natural resources; - presents the results of its own research on the assessment of environmental pollution; - knows the organizational and economic aspects of activities in the field of ecology and sustainable development; - Knows general environmental research methods; - predicts the quality of the state of environmental objects. - makes a conclusion on the results of its own research

approaches to their solution at the global, regional and local levels.	- has skills in analyzing environmental processes, setting specific tasks and priorities of sustainable development of nature and society and the use of the knowledge gained to solve environmental problems; - able to identify anthropogenic factors that may influence environmental objects; - apply this knowledge on the patterns of development of the biosphere and the conditions for maintaining its sustainability, as well as the implementation of ideas of sustainable development in different countries, including in the Republic of Kazakhstan;	
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11. Prerequisites: School program

12. Post requisites: epidemiology, infectious diseases, radiation hygiene and medical ecology

13. Literature

Primary:

1. Kenesariyev U.I. Ecology and public health: studies. For medical schools and colleges.-Almaty: Evero, 2011
2. Ecology sustainable development: textbook / M.S.Tonkopy (i.dr.) - Almaty: Economy, 2011.
3. Guvern'sky, Yu.D. Ecology and hygiene of the living environment for the specialists of Rospotrebnadzor: study guide. M: GEOTAR-Media, 2008.
4. Human ecology: textbook / ed. A.I. Grigorieva.-M: GEOTAR-Media, 2008.-240 + el.opt.disk (DVD-ROM).
5. Koshelev N.F. Hygiene of Water Supply for Troops: textbook.-2 nd ed.-SPb: Petroglyph, 2008.
6. Polyakova A.N. General hygiene, sanology and ecology: leaders for students of higher education nursing education of medical universities.-M: FGOU VUNMTS Roszdava, 2008.
6. Ivanov, V.P. General and Medical Ecology: textbook.-Rostov n / D: Fenix, 2010.
7. Sukhanov B.P. Sanitary supervision of the safe use of pesticides and mineral fertilizers: study guide. M: GEOTAR-Media, 2006.
8. Novikov Yu.V. Ecology, environment and people: studies.book.-3rd ed., Corr. And add-M: FAIR-Press, 2005.
9. Lakshin AM. General hygiene with the basics of human ecology: textbook. -M., 2004.
10. Pivovarov Yu.P. Hygiene and fundamentals of human ecology: textbook.-M: Academy Publishing Center, 2004.

Additional:

1. Khandogina, E.K., Gerasimova, N.A., Khandogina, A.V. Ecological Basis of Nature Management, M., "Forum", 2007.
2. Nikanorov A.M., Khorunzhaya T.A., Global Ecology, M., CJSC, Knigerservice, 2003.
3. Marfenin N.N. The concept of "sustainable development" in development / Russia in the outside world: 2002 (Analytical Yearbook) // Edited by: Danilova-Danilyana V.I., Stepanov S.A. -M.: Publishing house MNEPU, 2002.
4. Reports of the Ministry of Environmental Protection of the Republic of Kazakhstan "On the state of the environment of the Republic of Kazakhstan" 2000-2007

1. **Department: Chemical disciplines**
2. **Level of training: bachelor degree**
3. **Educational program: 6B07201 - technology of pharmaceutical production**
4. **Course: 1**
5. **Name of elective discipline: Inorganic and physical chemistry**
6. **Number of credits: 4 credits**
7. **Purpose:** to Teach the basics of modern inorganic chemistry and use the theoretical knowledge to describe the properties of elements and their compounds, as well as to understand the chemistry of the basic chemical production processes and phenomena required in the activity of the process engineer in solving practical problems of modern chemical technology.
8. **The content of the discipline:** Basic laws and patterns of inorganic and physical chemistry used in the pharmaceutical industry. Laws of the theory of solutions. Basic provisions of the theory of electrolytic dissociation. The mechanism of hydrolysis reactions in solutions of medicinal substances. Redox reactions. Redox potentials.

9. Tasks:

- to form students ' fundamental knowledge of modern chemical science and chemistry of elements and their compounds;
- to form system knowledge about the nature of chemical bonds and the structure of chemical compounds used in pharmacy;
- to teach to predict the possibility of chemical processes;
- to give an idea of the thermodynamics of electrolyte solutions, methods for measuring the pH of solutions, properties of buffer solutions;
- to give an idea of the kinetics of chemical reactions and catalysis.
- to form ideas about disperse systems and surface phenomena.
- to teach the skills of working with literature and electronic databases.

10. Rationale for the choice of discipline:

The discipline "Inorganic chemistry" examines the laws, theoretical positions and conclusions that underlie all chemical disciplines. Upon completion of the discipline, students must learn the basic chemical concepts, laws and modern nomenclature of inorganic compounds and their properties.

The program of inorganic chemistry is supposed to consider the basics of the most important topics of the course of inorganic chemistry. This course is designed to enable students to independently plan and perform various chemical studies, develop schemes and methods of analysis in accordance with the scientific problem posed to them.

11. Learning outcomes (competencies):

Knowledge (cognitive sphere)	Skills & perks (psychomotor sphere)	Personal and professional competences (relations)
- General theoretical bases of inorganic and physical chemistry for the application of knowledge and skills at all stages of manufacture and quality control of medicines; - connection of chemical properties of substances with the position of their constituent elements in the periodic table; - the main provisions of the theory of solutions, the law of active masses and the law of equivalents in relation to the problems of chemistry; - regularities of physical and chemical processes and conditions for achieving chemical equilibrium; - knowledge of thermodynamics of surface phenomena, physical and	- work with chemical reagents and equipment - niem.; - prepare solutions of a given concentration; --put simple educational research these experiments. - the skills of various methods of scientific research in the conduct of high-quality tion reactions. - has the skills of experimental determination of the thermal effect of chemical reactions. - complies with the rules of labor protection and safety, has the skills of safe work in the	- independent work with educational and reference literature; - calculation for the preparation of solutions of a given concentration; - determination and calculation of pH solutions; - handling of chemical equipment; - substantiates information from Internet resources and reference scientific literature for research work in the field of chemistry.

chemical properties of dispersed systems and high-molecular compounds. - the main sections and types of chemical analysis. - fundamentals of mathematical statistics needed to assess the accuracy, reproducibility and correctness of the analysis results.	chemical laboratory, is able to provide first aid.	
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12. Prerequisites. the study of these disciplines is preceded by the development of students of the school program of chemistry, physics, mathematics.

13. Post-requisites. chemistry and technology of synthetic drugs, industrial technology of drugs.

14. Literature:

in Russian:

Basic :

1. Glinka N.L. General chemistry. Volum 1-4.: manual for graduate students /N.L. Glinka, S.S. Babkina. -27th ed.-Almaty: «Evero», 2017.

2. Ferancova L. G., E. V. Nechepurenko Inorganic, physical and colloid chemistry. - Almaty: publishing house "Evero", 2014.

3. A. Belyaev Physical and colloidal chemistry. M.: GEOTAR-Media.2014.

4. Ferancova L. G., E. V. Nechepurenko Inorganic, physical and colloid chemistry. - Almaty: publishing house "Evero", 2014.

Additional:

1. Workshop on inorganic chemistry: training manual. - Electron.text Dan. ((47.2 MB). - M., 2017. - el. wholesale.disk (CD-ROM)

2. Chemistry [Electronic resource]: full multimedia chemistry course + all experiments in inorganic chemistry. - Moscow: Russobit Publishing, 2004. -3 o=El. wholesale. disk (CD-ROM)

1. Department: Engineering Disciplines

2. level of education: bachelor's degree

3. name of the educational program 6B07201 "Technology of pharmaceutical production»

4. Course: 2

5. Name of the elective discipline " Standardization, certification and metrology»

6. Number of credits - 3

7. Purpose: Formation of students ' theoretical foundations and practical skills in the basics of applied mechanics, principles of engineering calculation, connection of machine parts, mastering the characteristics of mechanisms and machines to the extent necessary for future professional activity in their specialty.

8. Content of the discipline: Machine, mechanism, communication mechanism. Kinematic pairs and their classification. The degree and structure of the kinematic chain and mechanism. Development of the principle of formation of mechanisms of red color.

Machine parts, the main connections of mechanisms and mechanisms; recommendations for the use of certain programs in the manufacture of grinding, mixing, flatbed and other machines.

9. Tasks

* to study the basic methods of structural, kinematic, power and dynamic analysis of mechanisms: the principles of engineering calculation for the strength of typical elements of the product.

* master the basics of designing machine parts and the basics of strength calculation;

* initial skills in the basic design and design of mechanical devices and gain an understanding of the sequence of product design and the main stages of design development;

* formation of tasks within the framework of professional competence and determination of ways to solve them;

10. Justification of the choice of discipline: bachelor's students studying on the tracks "maintenance of technological equipment of pharmaceutical production" and "design of pharmaceutical production" on the EP 6B07201-Technology of pharmaceutical production must perform the following types of professional activities:

- assembly of machine parts and mechanisms;
- assembly of mechanical devices used in pharmaceutical production during preparation of finished medicines;
- assembly of mechanical devices used in the production of extraction preparations;
- assembly of mechanical devices used in the production of medical/sanitary/ products.

11. Learning outcomes (competencies):

LO1	Demonstrates acquisition of knowledge for the development of applied subjects and for solving engineering problems in a production environment.
LO2	Carries out a structural and kinematic analysis of the mechanisms of machines and equipment and knows the range of parts and assemblies of mechanisms and machines used in the pharmaceutical industry.
LO3	Know the basics of designing and designing machines in the field of creating new machinery and equipment for equipping pharmaceutical production.
LO4	Able to use the principles of engineering calculations to develop technology for the manufacture of medical devices.
LO5	Capable of providing technical information in various forms, i.e. in the form of diagrams, conventional images and symbols, graphically in accordance with the requirements of GOST and ST.RK. and draw up independent work according to the rules of ESKD and ESDP.
LO6	Evaluates the technical conditions of a given moment of production and the tasks set for the development and improvement of technological processes.

12. Prerequisites: "Mathematics I", "Mathematics II", "Information and communication technologies", "Physics".

13. Post-requirements: "Fundamentals of design and equipment of pharmaceutical production", "Machines and automats for packaging and packaging of medicinal forms".

14. Literature:

1. Polyakhov N. N. Theoretical mechanics. Textbook M., Yurayt, 2016 – 593 p.
2. Vasko N. G. Theoretical mechanics. Textbook. - Rostov-on-Don: Phoenix, 2016. - 302 p.
3. Olofinsky V. P. Technical mechanics. Training manual. - M:Forum., 2013 – 352 p.
4. Kirsanov M. Solution of problems in theoretical mechanics. Textbook. - M., SIC INFRA, 2015. - 216 p.
5. Mirolyubov I. N. et al. Strength of materials: A guide to problem solving. 7th ed. - St. Petersburg: Ed. "Lan", 2017. - 512 p.
6. Kopnov V. A. Krivoshapko S. N. Resistance of materials. Manual for solving problems and performing laboratory and computational and graphic works. - M.: Higher School 2011. – 351p.
7. Erdedi A. A. Theoretical mechanics. Resistance of materials: A textbook for machinists. Text. Institutions/ A. A. Erdedi, N. A. Erdedi-4 ed. - M.: Higher school, 2012. – 318p.
8. Minin L. S. Khromatov V. E., Samsonov Yu. P. Calculation and test tasks on the resistance of materials. M.: Higher School, 2013. – 224p.
9. Ponomarev A. T., Zorin V. A. Resistance of materials. Course of lectures. Textbook. - M.: 2012. – 336p.

1. Department: Engineering Disciplines

2. Level of training: Bachelor

3. Specialty: 6B07201- Technology of Pharmaceutical Production

4. Course: 2

5. Name of elective discipline: “Theoretical mechanics and materials resistance”

6. Number of credits - 6

7. Purpose: formation of students' theoretical foundations and practical skills on the foundations of theoretical mechanics, on principles of engineering calculations, connection of machine parts, characteristics of mechanisms and machines to the extent necessary for future professional activities in their specialty

8. Content of the discipline

Fundamentals of statics, kinematics, dynamics. General principles calculation of structural elements; types of stress States, the strength of the hypothesis, the combined effect of torsion and bending. Concepts of ultrasonic strength, dynamic loads and endurance limit; stability under axial compression of the rod. Basic design parameters for the selection of structural material and the calculation of elements for strength. Chemical factors affecting the choice of design and material.

9. Tasks:

- study of the fundamentals of the methods of structural, kinematic, force and dynamic analysis of mechanisms: principles of engineering calculations for the strength of typical elements of products.
- mastering the basics of strength calculations and the basics of designing machine parts.
- getting an idea of sequence of product design and main stages of design development, primary skills in basics of designing and designing mechanical devices.
- formation of tasks and determination of ways to solve them within framework of professional competence.

10. Justification of the choice of discipline: bachelor's students studying on the tracks "maintenance of technological equipment of pharmaceutical production" and "design of pharmaceutical production" on EP 6B07201-Technology of pharmaceutical production must perform the following types of professional activities:

- development of technical specifications for the design of new and modernization of existing technologies, processes, technological lines or technological equipment;
- development of technological regulations for the production of finished drugs (laboratory, pilot, industrial, standard);
- development of design estimates for pharmaceutical and medical products;
- analysis and evaluation of alternative technological process options and individual stages using mathematical models;
- support and participation in commissioning.

11. Learning outcomes (competencies):

LO1	Demonstrates knowledge of the basic principles of theoretical mechanics and strength of materials and the theory of solid deformed bodies.
LO2	Knows methods for calculating the equilibrium and stress state of structural elements, kinematic and dynamic parameters of the movement of machine parts.
LO3	Draws up calculation schemes in accordance with the technical requirements for engineering structures of pharmaceutical production and schemes for calculating the strength, rigidity and stability of parts of production equipment.
LO4	Conducts analysis of transient processes, searches, collects, stores and processes information, including in Internet resources, and analyzes for the scope of professional activity.
LO5	Able to analyze drawings, diagrams and graphs obtained in the conditions of state and industrial laboratories as a result of research work.

12. Prerequisites: Mathematics I, Mathematics II, Information and communication technologies, Physics.

Related disciplines: Drawing geometry, Processes and apparatuses of chemical-pharmaceutical production-2

13. Post requisites: "Machines and automatos for packaging and packaging of medicinal forms", "Fundamentals of design and equipment of pharmaceutical production".

14. Reference

1. Mirolyubov I. N. et al. Strength of materials: Guide to problem solving. 7th ed. - St. Petersburg: Ed. "Lan", 2017. - 512 p.
2. Chernavskiy S. A., Bokov K. N., Chernin M. I. et al. Course design of machine parts. - M.: Mashinostroenie, 2015. - 416 p.
3. Dunaev P. F., Lelikov O. P. Design of units and parts of machines / Textbook. allowance for

tech. specialist. universities. – M.: Higher School, 2015. – 447 p.

4. Duzelbaev S. T. Laboratory workshop on the strength of materials. - Almaty: RIC for UML MES RK, 2016. - 95 p.

1. Department: «Engineering Disciplines»

2. level of education: bachelor's degree

3. name of the educational program 6B07201 – “Technology of pharmaceutical production”

4. Course: 2

5. Number of credits - 4

6. Name of the elective discipline “Drawing geometry”

7. Purpose: The Monge method. Monge epure. GOST standards 2.307-38, 2.302-68, 2.304-81, 2.303-68, 2.104-68. drawings GOST 2.307-68. geometry. Slope. The plane. Planes in general and independent position, a point and straight lines lying on the plane. Projection drawing. Scenes. GOST 2.305-68. additional type. Local view. Pages. Page definers. Surfaces of rotation. Straight lines with points on the surfaces of rotation. Sections. Cross sections. Types of cross-sections. Complex sections and their types. Find the third scene by two scenes. Performing prominent sections. Axonometric projections. Standard axonometric projections. Axonometry of the circle. They are located parallel to the three projection planes (horizontal, frontal, and profile). Grooved rotating and faceted bodies, their projections and rectangular axonometric projections (isometry, dimetry).

8. The content of the discipline: Projection methods. Expandable ruled surfaces and non-expandable surfaces. Projection drawing. Types of GOST 2.305-68. Ruled surfaces. Determinants of the surface. Types of curves (flat, spatial). The intersection of a multifaceted surface with a straight line, a plane and between themselves. Additional views. Local species. Axonometric surfaces. Cuts. Simple cuts. Sections.

9. Tasks: students mastering regulatory documents and state standards, which are the basis for compiling design and technical documentation

10. Justification of the choice of discipline:

bachelor's students studying on the tracks "maintenance of technological equipment of pharmaceutical production" and "design of pharmaceutical production" on the EP 6B07201-Technology of pharmaceutical production must perform the following types of professional activities:

* Ways of arbitrary placement of complex types of drawings on the plane and in space, sections and cuts;

* The correct choice of the dimensions of each element in accordance with the state standard when making drawings;

* Management of any type of drawings, including a simple frame and stamp;

* Preparation of projects in accordance with the standards and requirements of the drafting system;

* Refinement of finished projects and full implementation in programs.

11. Learning outcomes (competencies):

LO 1	Knows the design features of products used in the pharmaceutical industry
LO 2	Knows how to use technical regulations, standards and other regulatory documents
LO 3	He is able to use methods for constructing images (drawings) of spatial shapes on a plane
LO 4	Knows the methods of developing technical documentation on compliance with technological discipline in the conditions of existing production
LO 5	He is able to independently make sketches and carry out drawings of various technical details and structural elements of components of products of his future specialty
LO 6	He is able to work in small groups, solve tasks together.

12. Prerequisites: «Information and communication technologies», « Mathematics I», « Mathematics II».

13. Post-requirements: "Computer-engineering graphics in design", "Fundamentals of design and

equipment of production", "Machines and machines for packaging and packaging of dosage forms".

14. Reference:

1. Hibbeler, R. Ch. Statics and mechanics of materials: Vol.1: textbook / R. Ch.Hibbeler; Kaz. language.AUD. E. B. Dauseitov, S. Zhunisbekov. - 4th edition. - Almaty: LLP Rpbk "Era", 2017. - 436 P.
2. Baidibekov, A. K. engineering graphics (in a projection with digital signs): textbook / - Almaty: Evero, 2011. - 140 P.
3. Mirzakulov M. E., Turdaly K. M. descriptive geometry./ educational and methodical manual .- Shymkent 2022.
4. Mirzakulov M. E., Turdaly K. M. basic geometry./ educational-methodical postobie.- Shymkent 2022 G.

1. Department: chemical disciplines

2. Level of preparation: undergraduate

3. Specialty: 6B07201 - "Technology of pharmaceutical production"

4. Course: 2

5. Name of elective discipline: Organic chemistry

6. Number of credits. 3 credits

7. Purpose: Formation of students' knowledge of the theoretical foundations of organic chemistry, as well as the systematic laws of the chemical behavior of organic compounds in conjunction with their structure for the ability to solve chemical problems of pharmacology

8. Tasks:

- to form knowledge of the fundamentals of the structure and reactivity of organic compounds, which are the objects of studying organic chemistry;
- to give an idea of the relationship between the chemical composition, structure, properties and biological activity of organic substances;
- teach the ability to predict the reactivity of organic compounds;
- teach skills in working with literature and electronic databases.

9. Justification of the choice of discipline: When studying organic chemistry, students form knowledge of the theoretical foundations of organic chemistry, as well as the systematic patterns of the chemical behavior of organic compounds in conjunction with their structure, in order to solve the chemical problems of pharmacology, which are necessary in the activities of future pharmaceutical manufacturing technologists.

10.Learning outcomes (competencies):

Knowledge (cognitive sphere)	Skills and abilities (psychomotor sphere)	Personal and professional competences (relations)
Demonstrate knowledge and understanding in the study area, including elements of the most advanced knowledge in this area.	Demonstrates knowledge, goals and objectives of the course the theoretical foundations of organic chemistry	Competence in the field of natural and special Sciences
	Knows the principles of nomenclature and isomerism of organic compounds	
	He knows that organic compounds belong to certain classes and groups on the basis of knowledge of classification characteristics and has an idea of the role of biopolymers in the processes of life activity.	
	Knows the relationship of the structure and chemical properties of organic compounds with their biological activity.	

	Demonstrates knowledge of performing chemical calculations during the synthesis of organic compounds	
	Knows the devices and the principle of operation of chemical equipment, devices, rules for their operation	
	Knows the properties of organic substances used in pharmacy, based on the theoretical foundations of organic chemistry.	
Apply this knowledge and understanding in a professional manner.	Knows the rules of labor protection and safety work in the chemical	Competence "Lawyer
Formulate arguments and solve problems in the field of study	Demonstrates knowledge of the research methods of organic products used in pharmacy.	Competence "Research Skills"
Collect and interpret information to form judgments based on social, ethical, and scientific considerations.	She has the skills to organize a workplace for laboratory research.	Competence of entrepreneurship
Communicate information, ideas and problems and solutions, both to specialists and non-specialists.	Carries out a search, selection of information on the properties and application of organic substances in pharmacy from the Internet, educational, chemical reference literature for solving scientific and practical problems.	Computer and information competence
	Uses information from educational, reference books for the development of drugs of organic chemistry.	
Ability to continue further self-study	Demonstrates the ability to work in small groups, discuss the results of laboratory work on topics, conduct discussions.	Competence "Communication skills" (cultural competence, critical thinking, creativity, ability to work in a team, foreign language competence)

11.Prerequisites. the study of these disciplines is preceded by the development of students of the school program of chemistry, physics, mathematics.

12.Post-requisites. chemistry and technology of synthetic drugs, industrial technology of drugs.

13.Literature

in Russian:

Basic :

1. Tyukavkina N.. Bioorganicheskaya chemistry. Textbook for universities. Special course. Book-2, Moscow. Bustard, 2011. -592 p.
2. Patsaev, A. K., Alikhanov, Kh., Akhmetova, Educational and methodical manual for laboratory and practical training in organic chemistry. Educational and methodical manual. Shymkent, 2012, - 164s.

3. Patsaev A. K. Educational and methodical manual on organic chemistry for independent work of students of pharmaceutical faculties. Shymkent, 2007. - 273c.
4. Patsaev, A. K. Biopolymers, lipids: proc. benefit. - Shymkent : UKGM, 2004. - 138 p. - ISBN 9965-667-95-0. :
5. Patsaev, A. K. Heterocyclic compound. Alkaloids: studies. benefit. - Shymkent: B. I., 2004.
6. Patsaev, K. Functional derivatives of hydrocarbons: studies. benefit. - Shymkent: B. I., 2003.
7. Patsaev A. K. Hydrocarbons: a training manual. - Shymkent: B. I., 2002. -152 p.
8. Patsaev, K. K. Theoretical foundations of organic chemistry: studies. benefit. - Shymkent: B. I., 2000. - 151 p.

Additional:

1. Department: of chemical disciplines

2. Level of preparation: baccalaureate

3. Specialty: 6B07201 - "Technology of pharmaceutical production"

4. Course: 2

5. Name of elective discipline: analytical chemistry

6. Amount of credits: 4

7. Purpose: Teaching the general theoretical fundamentals of modern analytical chemistry and the use of the obtained theoretical knowledge in drug development, expertise, standardization and research of the dosage forms necessary in the activity of the process engineer in solving practical problems of modern chemical technology.

8. Tasks:

- to form students' knowledge of basic concepts and methods of analytical chemistry;
- to form the theoretical and practical bases of qualitative and quantitative analysis;
- to form students' knowledge of the properties of chemicals in the analysis of pharmaceuticals;
- teach how to make calculations for the preparation of solutions of predetermined concentrations.

9. Justification of the choice of discipline:

The goal of analytical chemistry as an academic discipline is to develop students' knowledge, skills and abilities of chemical analysis.

The main objective of the course of analytical chemistry for students of pharmaceutical faculties of higher professional education is to familiarize students with the main sections of analytical chemistry, which serve as a theoretical basis for a more complete and in-depth study of biochemistry, pharmaceutical chemistry, physiology, pharmacology, technology of medicinal substances and a number of other special disciplines.

10. Learning outcomes

Knowledge (cognitive sphere)	Skills and abilities (psychomotor sphere)	Personal and professional competencies (relationships)
- puts the simplest teaching and research, chemical and analytical experiments; - applies a qualitative analysis of chemical compounds by cations, anions and functional groups; -applies a quantitative analysis of chemical compounds by titrimetric methods;	-formulates its own conclusions on the prediction of products of all types of qualitative reactions by cations, anions and functional groups; - argues the principles of correct pH calculation and preparation of buffer solutions, hydrolyzing salts, electrolyte solutions and non-electrolytes;	-uses information materials and interprets the results of research in the field of qualitative and quantitative analysis for medical and pharmaceutical science; - focuses on modern information flows and makes conclusions on experimental research in the field of analytical chemistry; - reports information obtained from educational reference, scientific literature, Internet

- uses a qualitative and quantitative analysis of chemical compounds by physicochemical methods; - prepares solutions of standard substances, titrants, standardizes titrants; - owns the skills of various methods of scientific research in the preparation of solutions of specified concentrations and the performance of qualitative reactions of cations and anions.	- understands and explains the characteristic properties of acid-base, redox, complexometric and precipitation titration methods; - justifies the results of educational experiments, explains the observed facts and phenomena from a scientific point of view.	- resources offering their own judgments and opinions; - publicly speaking with the presentation of their own judgments, analysis and synthesis of information in the field of analytical chemistry.
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11. Prerequisites: inorganic chemistry, physics, mathematics, molecular biology.

12. Post requisites: pharmaceutical chemistry, industrial technology of drugs, toxicological chemistry.

13. Literature

The main:

1. Kharitonov L.G. Analytical chemistry. Analytics 1. General theoretical foundations. Qualitative analysis: a textbook - M.: GEOTAR-Media, 2014.
2. Kharitonov L.G. Analytical chemistry. Analytics 2. Quantitative analysis. Physico-chemical (instrumental) methods of analysis: a textbook - M.: GEOTAR-Media, 2014.
3. Kharitonov L.G. Analytical chemistry. Quantitative analysis, physico-chemical methods of analysis: workshop: textbook. allowance. - M.: GEOTAR-Media, 2012.
4. Kharitonov L.G. Analytical chemistry. Workshop. High-quality chemical analysis: studies. allowance.- M.: GEOTAR-Media, 2009.
5. Patsaev, A. K. A Guide to Laboratory Studies in Analytical Chemistry: studies. allowance. - Shymkent, 2010.

Additional:

1. Kharitonov, Yu. Ya. Analytical chemistry. Qualitative analysis. Titrimetry [Electronic resource]: textbook / Yu. Ya. Kharitonov. - Electronic text data. (39.9Mb). - M.: GEOTAR - Media, 2017.
2. Kharitonov, Yu. Ya. Analytical chemistry. Analytics - 1. General theoretical foundations. Qualitative analysis [Electronic resource]: textbook / Yu. Ya. Kharitonov. - Electronic text data. (44.3Mb). - M.: GEOTAR - Media, 2017
3. Kharitonov, Yu. Ya. Analytical chemistry. Analytics - 2. Quantitative analysis. Physical and chemical (instrumental) methods of analysis [Electronic resource]: textbook / Yu. Ya. Kharitonov. - Electronic text data. (43.1Mb). - M.: GEOTAR - Media, 2017.
4. The course of analytical chemistry [Electronic resource]: studies. / I. K. Tsitovich. - El. text given. (13.5 MB) - M., 2003. - 1 email. wholesale disk

1. Department of Drug Technology and Pharmacognosy

2. Level of training (Bachelor's degree)

3. Educational program: 6B07201- " Technology of pharmaceutical production»

4. Course: 3

5. Name of elective discipline: "Chemistry of natural medicinal compounds»

6. Number of credits: 5 credits (150 hours)

7. Purpose: to form the necessary knowledge, skills and abilities of future specialists in the rational, scientifically-based procurement of medicinal plant raw materials, carrying out its standardization and quality control, as well as through the use and application in practice of medicinal products of plant origin

8. Content of the discipline: General laws and regularities of the chemistry of natural compounds. Classification of biological active substances, distribution and accumulation of biological active substances in plants. Methods for determining the structure, extraction of medicinal substances from plant sources, separation, purification and identification of biological active substances.

9. Tasks:

* to give students knowledge about the botanical, pharmacognostic characteristics, chemical composition of medicinal plants (LR) and medicinal plant raw materials(LRS), ways of its use by the phytoproduction industry;

* teach students to use the methods of pharmacognostic and commodity analysis of medicinal plant raw materials, standardization at various stages of procurement and use;

* teach students to determine the methods of rational harvesting of LRS, stocks of wild plants in connection with the ever-growing needs of the domestic pharmaceutical industry in high-quality medicinal plant raw materials.

* formation of students ' knowledge of phytochemistry of medicinal plants, physical and chemical properties of extractants and solvents, practical skills in the implementation of the technological process of preparation of extraction and complex pharmaceutical preparations with the use of modern equipment and new technologies.

10. Justification of the choice of discipline:

Taking into account the increased requirements of practical pharmacy and medicine for the use of medicinal raw materials of plant, animal and mineral origin, the subject "Chemistry of natural medicinal compounds" considers a range of issues related to the effectiveness of quality control at all stages of drug development.

Ensuring the proper quality of medicinal plant raw materials largely depends on the proper organization of control, its effectiveness and efficiency, as well as on the level of requirements laid down in regulatory documents (GF, RD, VARD) and the methods of analysis used. The study of the system of quality standards of medicinal raw materials, their products, testing methods, etc., established in the national order and mandatory for manufacturers and consumers is currently an urgent problem in the Republic of Kazakhstan.

11. Learning outcomes (competencies):

Knowledge (cognitive sphere)	Skills and abilities (psychomotor sphere)	Personal and professional competencies (relationships)
- general laws and regularities of the chemistry of a natural compound; - classification of biological active substances, distribution and accumulation of biological active substances in plants; - apply methods of separation, purification and identification of natural medicinal compounds, formalize the results of laboratory work and draw appropriate conclusions based on them;	- the results of educational experiments, observed facts and phenomena, their causal relationships from a scientific point of view and the maximum yield of biologically active substances from natural sources; - collects information, evaluates and interprets the results of educational experiments, explains the accumulation of biological active substances in medicinal plants; works in a group and solves assigned tasks; - organize production areas and storage areas, maintain documentation in accordance with the RD, GF specifications for raw materials and monitor the quality of plant raw materials, depending on the nature of the PRM;	- Collects information, evaluates and interprets the results of educational and scientific experiments in the field of chemistry of medicinal natural compounds; - evaluates modern achievements of science and the field of pharmacy, compiles reviews and reports, prepares scientific publications - Capable of analyzing medicinal compounds in medicinal plant raw materials - Adheres to the principles of academic integrity and learning behavior in the performance of written works, answers to exams

12. Prerequisites: Processes and devices of chemical and pharmaceutical production

13. Post-requirements: technology of extraction preparations

14. Literature

The main:

1. Табиғи дәрілік заттардың химиясы : оқулық / Ә. Қ. Патсаев. –Шымкент :Әлем, 2016. – 188 бет с.
2. Патсаев, А. К. Химия природных лекарственных веществ : учебник / А. К. Патсаев, Г. А. Туребекова, К. Дж. Кучербаев. –Шымкент :Әлем, 2016. – 192 с. -
3. Дәрілік өсімдік шикізаттарын фармакогностикалық талдау. Оқу құралы/ Орынбасарова К.К.-Шымкент, 2016
4. Орынбасарова К. К.Дәрілік өсімдік шикізаттарын фармакогностикалық талдау : оқуқұралы. –Алматы : ЭСПИ, 2021. – 308 бет.
5. Тоқсанбаева Ж. С. Фармакогнозия. Т.1 : оқулық / Ж. С. Тоқсанбаева, Т. С. Серікбаева, К. К. Патсаева. –Алматы : ЭСПИ, 2021. – 252 бет.
6. Тоқсанбаева Ж. С. Фармакогнозия. Т.2 : оқулық / Ж. С. Тоқсанбаева, Т. С. Серікбаева, К. К. Патсаева. –Алматы : ЭСПИ, 2021. – 264 бет
7. Табиғи дәрілік қосылыстардың химиясы пәнінің зертханалық сабақтарына арналған қолданба : оқу құралы / К. К. Орынбасарова, Г. С. Рахманова. – Алматы : New book, 2022.- 300 б.

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1. Айдарбаева, Д. Қ. Қазақстанның пайдалы өсімдіктері: монография / Д. Қ. Айдарбаева ; ҚР Білім және ғылым Министірлігі. Абай атындағы ҚҰПУ. –Карағанды : АҚНҰР, 2014. – 290 б.
2. Айдарбаева, Д. К. Растительные ресурсы Казахстана и их рациональное использование: учебное пособие. – 2-е изд. –Караганда : АҚНҰР, 2019. – 194 с
3. Фармакогнозия пәнінің зертханалық-тәжірибелік сабақтарына арналған қолданба: оқу құралы / Б. Қ. Махатов [ж. б.] ; ҚР ДСМ; ОҚМФА. –Шымкент : Б. ж., 2013. – 328 бет. Фармакогнозия. Рабочая тетрадь к практическим занятиям:И. В. Гравель [и др.]; под ред. И. А. Самылиной ; М-во образования и науки РФ. – 2-е изд., испр. Идоп ; Рек. ГОУ ВПО Московская мед. Акад. Им. И. М. Сеченова. –М. : ГЭОТАР – Медиа, 2013. – 264 с

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1. Табиғи дәрілік заттардың химиясы мен технологиясы : Оқу-әдістемелік кешен 5В074800 – фармацевтикалық өндіріс технологиясы мамандығы үшін. / Құраст. С.О. Кенжетеева, Л. Ж. Жапарова. –Қарағанды: ҚарМУбаспасы, 2013. – 60 б. РМЭБ <http://rmebrk.kz/>
2. Махатов Б.Қ.Фармакогнозия: оқулық/Махатов Б.Қ., Патсаев Ә.Қ., ОрынбасароваК.К., Қадишаева Ж.А. – Алматы Эверо, 2020.https://www.elib.kz/ru/search/read_book/795/
3. Махатов Б.Қ., Патсаев Ә.Қ., Қадишаева Ж.А., Т.С. Серікбаева,Е.К. Оразбеков Фармакогнозия пәнінен оқу қолданбасы. Оқу-әдістемелік құрал — Алматы, ЖШС «Эверо», 2020,https://www.elib.kz/ru/search/read_book/807/
4. Джангозина Д.М., Лосева И.В., Ивлева Л.П., Дербуш С.Н.Лекарственные растения, лекарственное растительное сырье и некоторые продукты переработки сырья животного происхождения.Учебное пособие по фармакогнозии. Издание второе, доп. Часть I: Лекарственные растения и лекарственное растительное сырье, содержащие углеводы, жиры и жироподобные вещества, витамины, терпеноиды. – Алматы: издательство «Эверо», 2018. – 206 с.https://www.elib.kz/ru/search/read_book/744/
5. Джангозина Д.М., Лосева И.В., Ивлева Л.П., Дербуш С.Н.Лекарственные растения, лекарственное растительное сырье и некоторые продукты переработки сырья животного происхождения.Учебное пособие по фармакогнозии. Издание второе, доп. Часть II: Лекарственные растения и лекарственное растительное сырье, содержащие сердечные гликозиды, сапонины, алкалоиды. – Алматы: издательство «Эверо», 2020. – 194 с.https://www.elib.kz/ru/search/read_book/746/
6. Джангозина Д.М., Лосева И.В., Ивлева Л.П., Дербуш С.Н.Лекарственные растения, лекарственное растительное сырье и некоторые продукты переработки сырья животного происхождения.Учебное пособие по фармакогнозии. Издание второе, доп. Часть III: Лекарственные растения и лекарственное растительное сырье, содержащие фенольные соединения и их гликозиды; кумарины, хромоны, лигнаны, антраценпроизводные,

флавоноиды, дубильные вещества, биологически активные вещества малоизученного состава и лекарственное сырье животного происхождения. – Алматы: издательство «Эверо», 2020. – 220 с. https://www.elib.kz/ru/search/read_book/748/

7. Джангозина Д.М. м.ғ.д. Дәрілікөсімдіктер және дәрілікөсімдік шикізаты: оқу құралы – Алматы: «Эверо» баспасы, 2020. – 240б. https://www.elib.kz/ru/search/read_book/742/

1. Department Organization and Management of Pharmaceutical Business

2. Undergraduate

3. Educational program 6B07201 - "Pharmaceutical production technology"

4. Course 3

5. Name of the elective discipline Pharmaceutical industry economics and digitalization processes

6. Number of credits 5

7. Objectives:

Formation of skills for analyzing the development of the pharmaceutical industry in the Republic of Kazakhstan and determining the results of the economic activities of pharmaceutical enterprises.

8. The content of the discipline:

Organizational and legal forms of entrepreneurial activity. Accounting and planning of fixed assets. Calculation of production costs and production costs in the pharmaceutical industry. Pricing of pharmaceutical industry enterprises. Marketing in the pharmaceutical industry. Principles and processes of digitalization in the pharmaceutical industry

9. Tasks:

- Demonstrates knowledge of the specifics of the economics of pharmaceutical industry enterprises and consumer behavior in the pharmaceutical market, the elements of organization and management processes in pharmaceutical enterprises.
- Develops the assortment policy of the enterprise, selects organizational and legal forms of entrepreneurship in the pharmaceutical industry.
- Draws up the planning stages of fixed and current production assets .
- To form knowledge and compare, to determine the relationship between individual indicators of the pharmaceutical company's economic activity
- Systematize the acquired knowledge in the field of pharmaceutical and engineering sciences, adapts it to practical activities; has interdisciplinary communication, applies information based on IT technology in the field of professional activity.

10. Rationale for the choice of discipline:

The subject is of great importance for the training of future specialists, as it allows you to study the economics of the pharmaceutical industry.

11. Learning outcomes (competencies)

Demonstrates knowledge of external and internal regulatory and technical documents and acts in the conditions of technological production and in the process of updating them

- Collects, processes and scientifically based information analysis using artificial intelligence tools and digital platforms, provides critical assessment and demonstrates the ability to conduct research / experimental work on the introduction of new technologies, new equipment into production, and to expand the range of products.
- Demonstrates the ability to focus on improving the efficiency of work results based on the analysis of technical and economic indicators of production
- Applies the laws of chemical and technological/pharmaceutical processes at a professional level to organize the technological process of manufacturing specific pharmaceutical and medical products
- Organizes and manages human resources to implement the technological process and solve production problems in accordance with the production strategy
- Develops science-based projects and business plans for improving technological processes using elements of artificial intelligence and digital technologies and defends the introduction of innovative solutions into production in a reasoned manner (written and oral reports, presentations, articles).

- Has the skills for independent continuous professional self-education and effective communication in interactions with different specialists at different levels to solve production problems
- Demonstrates knowledge and understanding of the pharmaceutical industry issues in their interrelation and interdependence with other social spheres and legal requirements, and an understanding of current trends and prospects for the development of the pharmaceutical industry

12. Prerequisites Information and communication technologies

13. Postrequisites Chemical process control system (automation).

14. Literature

Main

1. Utegenova G. I. economics of the pharmaceutical industry: textbook-Zhasulan -2022.
2. Urkunchiev, E. M. production management: training / E. M. Urkunchiev, a.m. Zhusanbayev ; MES of the Republic of Kazakhstan; M. H. Dulatitagarazmeml. "no," he said. - Almaty: Evero, 2013. - 160 pages
3. Shertaeva , K. D. economics of Pharmacy [text] : textbook / Shertaeva K. D. , Utegenova G. I. ; Ministry of Health and social development of the Republic of Kazakhstan. SKSPHA. - Shymkent: [B. I.], 2016. - 211 PP.
4. Utegenova G. I. Pharmaceutical Industry Economy: учебник-Zhasulan -2022
5. Shertayeva, K. D. economics of Pharmacy: учебник / Shertaeva K. D., Utegenova G. I. ; M-Health and social development of the Republic of Kazakhstan. YUKGFA. - Shymkent: [B. I.], 2015. - 221 P
6. Arystanov, zh. M. management and economics of Pharmacy: teacher / zh. m.Arystanov. - Almaty: Evero, 2015 . - 728 P.

Additional:

1. Shertayeva, K. D. fundamentals of Pharmacoeconomics: textbook; Ministry of Social Development and health of the Republic of Kazakhstan. SKSPHA. - Shymkent: SKSPHA, 2015
2. Shertayeva, K. D. pharmaceutical industry of the economy [text] : учебник / Shertayeva K. D., Utegenova G. I. - Shymkent: YUKMA, 2022. - 144 P.
- 3.scientific and methodological coverage of innovative projects of pharmaceutical enterprises at the regional level [text] : methodical. "I don't know," he said.]. - Almaty: [B. I.], 2015.
- 4.lecture complex on the discipline" fundamentals of Pharmacoeconomics". Specialty: 5b110300 - " pharmacy "[text] = thesis on the discipline"fundamentals of Pharmacoeconomics". Speciality

1. Department of Pharmacognosy

2. Level of training (Bachelor's degree)

3. Educational program: 6B07201- " Technology of pharmaceutical production»

4. Course: 3

5. Name of elective discipline: "Chemistry of natural medicinal compounds»

6. Number of credits: 5 credits (150 hours)

7. Purpose: to form the necessary knowledge, skills and abilities of future specialists in the rational, scientifically-based procurement of medicinal plant raw materials, carrying out its standardization and quality control, as well as through the use and application in practice of medicinal products of plant origin

8. Content of the discipline: General laws and regularities of the chemistry of natural compounds. Classification of biological active substances, distribution and accumulation of biological active substances in plants. Methods for determining the structure, extraction of medicinal substances from plant sources, separation, purification and identification of biological active substances.

9. Tasks:

* to give students knowledge about the botanical, pharmacognostic characteristics, chemical composition of medicinal plants (LR) and medicinal plant raw materials(LRS), ways of its use by the phytoproduction industry;

* teach students to use the methods of pharmacognostic and commodity analysis of medicinal plant raw materials, standardization at various stages of procurement and use;

* teach students to determine the methods of rational harvesting of LRS, stocks of wild plants in connection with the ever-growing needs of the domestic pharmaceutical industry in high-quality medicinal plant raw materials.

* formation of students' knowledge of phytochemistry of medicinal plants, physical and chemical properties of extractants and solvents, practical skills in the implementation of the technological process of preparation of extraction and complex pharmaceutical preparations with the use of modern equipment and new technologies.

10. Justification of the choice of discipline:

Taking into account the increased requirements of practical pharmacy and medicine for the use of medicinal raw materials of plant, animal and mineral origin, the subject "Chemistry of natural medicinal compounds" considers a range of issues related to the effectiveness of quality control at all stages of drug development. Ensuring the proper quality of medicinal plant raw materials largely depends on the proper organization of control, its effectiveness and efficiency, as well as on the level of requirements laid down in regulatory documents (GF, RD, VARD) and the methods of analysis used. The study of the system of quality standards of medicinal raw materials, their products, testing methods, etc., established in the national order and mandatory for manufacturers and consumers is currently an urgent problem in the Republic of Kazakhstan.

11. Learning outcomes (competencies):

Knowledge (cognitive sphere)	Skills and abilities (psychomotor sphere)	Personal and professional competencies (relationships)
- general laws and regularities of the chemistry of a natural compound; - classification of biological active substances, distribution and accumulation of biological active substances in plants; - apply methods of separation, purification and identification of natural medicinal compounds, formalize the results of laboratory work and draw appropriate conclusions based on them;	- the results of educational experiments, observed facts and phenomena, their causal relationships from a scientific point of view and the maximum yield of biologically active substances from natural sources; - collects information, evaluates and interprets the results of educational experiments, explains the accumulation of biological active substances in medicinal plants; works in a group and solves assigned tasks; - organize production areas and storage areas, maintain documentation in accordance with the RD, GF specifications for raw materials and monitor the quality of plant raw materials, depending on the nature of the PRM;	- Collects information, evaluates and interprets the results of educational and scientific experiments in the field of chemistry of medicinal natural compounds; - evaluates modern achievements of science and the field of pharmacy, compiles reviews and reports, prepares scientific publications - Capable of analyzing medicinal compounds in medicinal plant raw materials - Adheres to the principles of academic integrity and learning behavior in the performance of written works, answers to exams

12. Prerequisites: Processes and devices of chemical and pharmaceutical production

13. Post-requirements: technology of extraction preparations

15. Literature

The main:

8. Табиғи дәрілік заттардың химиясы : оқулық / Ә. Қ. Патсаев. –Шымкент :Әлем, 2016. – 188 бет с.

9. Патсаев, А. К. Химия природных лекарственных веществ : учебник / А. К. Патсаев, Г. А. Туребекова, К. Дж. Кучербаев. –Шымкент :Әлем, 2016. – 192 с. -

10. Дәрілік өсімдік шикізаттарын фармакогностикалық талдау. Оқу құралы/ Орынбасарова К.К.-Шымкент, 2016

11. Орынбасарова К. К. Дәрілік өсімдік шикізаттарын фармакогностикалық талдау : оқу құралы. – Алматы : ЭСПИ, 2021. – 308 бет.
12. Тоқсанбаева Ж. С. Фармакогнозия. Т.1 : оқулық / Ж. С. Тоқсанбаева, Т. С. Серікбаева, К. К. Патсаева. – Алматы : ЭСПИ, 2021. – 252 бет.
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Additional:

4. Айдарбаева, Д. Қ. Қазақстанның пайдалы өсімдіктері: монография / Д. Қ. Айдарбаева ; ҚР Білім және ғылым Министірілігі. Абай атындағы ҚҰПУ. –Қарағанды : АҚНҰР, 2014. – 290 б.
5. Айдарбаева, Д. К. Растительные ресурсы Казахстана и их рациональное использование: учебное пособие. – 2-е изд. –Қарағанда : АҚНҰР, 2019. – 194 с
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14. Джангозина Д.М. м.ғ.д. Дәрілік өсімдіктер және дәрілік өсімдік шикізаты: оқу құралы – Алматы: «Эверо» баспасы, 2020. – 240 б. https://www.elib.kz/ru/search/read_book/742/

1. **Department: Drug Technology and Pharmacognosy.**
2. **Level of education: Bachelor's degree.**
3. **Educational program: Pharmaceutical production technology.**
4. **Year of study: 3**
5. **Name of the elective discipline: Technology of medical and cosmetic products.**
6. **Number of credits: 5**
7. **The purpose of the discipline:** To develop skills in the preparation of medicinal and cosmetic products, taking into account the requirements of the GMR standard.
8. **Content of the discipline:** Actual problems of creation of medical and cosmetic products, State rationing of production of medical and cosmetic products, their classification and features of their industrial technology.
9. **Objectives:-** mastering the theoretical foundations of the technology of medical and cosmetic products; – obtaining professional skills and preparation of medical and cosmetic products; – conducting an assessment of the quality of medical and cosmetic products; – training in the use of regulatory and technical documents (orders, instructions and pharmacopoeial articles of the Republic of Kazakhstan) in the preparation of medicinal and cosmetic products.
10. **Justification of the choice of the discipline:** In modern conditions, special directions in the activity of a technologist have been formed, which are the result of market transformations and reforms. With the advent of new structures and new forms of organization in the pharmaceutical industry, there is a need for personnel of various specializations. The discipline "Technology of medical and cosmetic products" studies the theoretical basis and technology of manufacturing cosmetics, taking into account the achievements of pharmaceutical science and practice, plays an important role in the formation of specialists in the specialty "Technology of pharmaceutical production" in providing graduates with special training.

11. Learning outcomes:

LO1	Demonstrates knowledge of the subject and objectives of the technology of medical and cosmetic products, knows terminology, knows methods and techniques for assessing the quality of medical and cosmetic products, international nonproprietary names, classification and nomenclature of medical and cosmetic products, prescription, its structure, regulatory documentation, regulatory structure, prescribing rules, requirements for shelf life of prescriptions and others
LO2	is able to work with literature, electronic databases and computer training programs, applies the acquired knowledge to solve problems in the manufacture of medical and cosmetic products, conducts the technological process of manufacturing medical and cosmetic products in accordance with the ND (technological regulations, OST, GOST, etc.).
LO3	is able to provide personal opinions on the manufacture of medical and cosmetic products. funds, formalize it in the form of an abstract, presentation and present it in practical classes, student scientific circles, conferences, etc.
LO4	is able to search and process data on medical and cosmetic products to advise doctors, pharmacists, and the public on their use of information.
LO5	is able to transfer knowledge on the development and implementation of innovative technologies in the field of pharmaceutical production to students and other interested persons; to inform and advise doctors of medical institutions about new biotechnological synthesis drugs and their rational use and storage.
LO6	Understands the importance of principles and culture of academic integrity; He knows and understands a set of values and principles that express the student's honesty in learning when performing written work (essays, essays, test assignments, etc.), answering classes and exams, in research, expressing his position, in relationships with academic staff, teachers and other students.

12. **Prerequisites:** Latin language, technology of dosage forms, technology of extraction preparations

13. **Post-requirements:** professional activity.

14. **Literature:**

Main In the Kazakh language

1. Sagyndykova B.A., Anarbayeva R.M. Darilik turlerdin tazhiribelik tehnologiyasi: textbook. Karaganda: Medet Group, 2021. 427 pages.

2. Sagyndykova, B.A., Anarbayeva, R.M. Darilerdin darikhanalyk tehnologiyasi: textbook. Karaganda: Medet Group, 2021. 556 pages.
3. Baizoldanov T. Homeopathyalyk darilik kalyptar: a textbook.–Almaty: Evero, 2020.–184 p.
4. Pharmaceutical technology. High-molecular compounds in pharmacy and medicine: a textbook / edited by I.I. Krasnyuk. Moscow: GEOTAR - Media, 2016. 560 p.

Additional information:

1. The State Pharmacopoeia of the Republic of Kazakhstan. Vol. 1. Almaty: Zhibekzholy Publishing House, 2015. 720 p.
2. The State Pharmacopoeia of the Republic of Kazakhstan, vol. 2. Almaty: Zhibekzholy Publishing House, 2009 – 804 p.
3. The State Pharmacopoeia of the Republic of Kazakhstan, vol. 3. Almaty: Zhibekzholy Publishing House, 2014, 872 p.
4. Loyd, V. Allen. Pharmaceutical technology. Manufacture of medicines studies. The manual, Moscow : GEOTAR - Media, 2014. 512 p.
5. Pharmaceutical technology: a textbook. Grossman V.A. 2013
6. Baizoldanov, T. Kosmetik preparattar zhane olardi dayindauda koldanylatyn belsendi zhane komekshi zattar [Matin] : oku kuraly. Almaty : Evero Publ., 2016. 212 b.

Electronic resource:

1. The UMKD of the discipline is posted on the educational portal of the UCMA <https://ukma.kz>
2. The UKMA Electronic Library - <https://e-lib.skma.edu.kz/genres>
3. Republican Interuniversity Electronic Library (RMEB) – <http://rmebrk.kz/>
4. Aknurpress Digital Library - <https://www.aknurpress.kz/>
5. Epigraph Electronic Library - <http://www.elib.kz/>
6. Epigraf - multimedia textbook portal <https://mbook.kz/ru/index/>
7. EBS IPR SMART <https://www.iprbookshop.ru/auth>
8. Information and legal system "Zan" - <https://zan.kz/ru>
9. Medline Ultimate EBSSO
10. eBook Medical Collection EBSSO
11. Scopus - <https://www.scopus.com/>

Online resource:

1. Kazakhstan Republicasi Densaulyk Aktau Minister of Health 2021 zhylgy 7 shildegi No. KR DSM-58 buyrgy "Darilik zattar men meditsinalyk buyimdardyn aynaly salasyndagy objectylerge koylatyn sanitariyalyk-epidemiologiyalyk talaptar" sanitariyalyk kagidalaryn bekit turaly" <https://adilet.zan.kz/kaz/docs/V2100023416>
2. Kazakhstan Republicasi Densaulyk Aktau Minister of Finance 2021 zhylgy 27 kantardagi No. KR DSM-11 buyrgy "Darilik zattar men meditsinalyk buyimdardi tanbalau kagidalaryn bekit turaly" <https://adilet.zan.kz/kaz/docs/V2100022146>
3. Kazakhstan Republicasi Densaulyk aktau ministerin 2020 zhylgy 20 zheltoksandagy No. KR DSM-286/2020 buyrgy "Darilik preparation men meditsinalyk buyimdardy dayindaug licensy bar, darilik preparation men meditsinalyk buyimdardyn ainalysy salasyndagy subjectylerdin darilik drug men meditsinalyk buyymdardy dayindau kagidalaryn bekitu turaly" <https://adilet.zan.kz/kaz/docs/V2000021840>
4. Kazakhstan Republicasi Densaulyk Aktau ministerin 2020 zhylgy 20 zheltoksandagi No. KR DSM-287/2020 buyrgy "Dayyndalghan darilik preparation targa darikhanaishilik bakylau zhurgizu kagidalaryn bekit turaly" <https://adilet.zan.kz/kaz/docs/V2000021835>
5. Kazakhstan Republikasy Densaulyk Aktau Minister M.A. 2021 zhylgy 4 akpandagi No. KR DSM-15 buyrgy. Tiisti Pharmaceuticals praktikalards bekit turaly <https://adilet.zan.kz/kaz/docs/V2100022167>
6. Pharmacopoeia of the Eurasian Economic Union (EAEU), Volume 1, Part 1. Moscow, Eurasian Economic Commission, 2020 https://eec.eaeunion.org/upload/medialibrary/bd2/Farmakopeya-2020-t1_1.pdf
7. Pharmacopoeia of the Eurasian Economic Union (EAEU), Volume 1, Part 2. Moscow, Eurasian Economic Commission, 2023 <https://eec.eaeunion.org/upload/medialibrary/9de/2-chast-1-toma-Farmakopei-Soyuza-s-vozmozhnostyu-poiska.pdf>
8. Pharmacopoeia of the Eurasian Economic Union (EAEU), Volume 1, Part 3. Moscow, Eurasian Economic Commission, 2024

9. General formulation: a textbook / T. R. Grishina, O. A. Gromova, I. V. Gogoleva [et al.]. Moscow : IP Media, 2023. 134 p. — ISBN 978-5-4497-2299-7. — Text : electronic // Digital educational resource IPR SMART : [website]. — URL: <https://www.iprbookshop.ru/132145.html>

1. Department: Drug Technology and Pharmacognosy.

2. Level of education: Bachelor's degree.

3. Educational program: Pharmaceutical production technology.

4. Year of study: 3

5. Name of the elective discipline: Technology of dosage forms.

6. Number of credits: 5

7. The purpose of the discipline: Formation of systemic knowledge and skills in the manufacture and quality control of dosage forms.

8. Content of the discipline: Basic concepts and tasks of technologies of dosage forms. Solid dosage forms, powders. Characteristic. Requirements for them. The technology of aqueous and non-aqueous solutions. IUD solutions. Suspensions and emulsions. Mild dosage forms (ointments, suppositories). Sterile and aseptically prepared dosage forms.

9. Objectives: Mastering the theoretical foundations of the technology of dosage forms; – obtaining professional skills and skills in manufacturing dosage forms; – implementation of intra - pharmacy control of pharmaceutical dosage forms; – training in the use of regulatory documents (orders, instructions and pharmacopoeia articles of the Republic of Kazakhstan) in the preparation of medicines.

10. Justification of the choice of the discipline: When studying this subject, students for the first time gain knowledge about the following concepts: medicine, medicinal substance, dosage form, drug, medicinal product, technological process, stages, operations, classification of medicinal products (potent, non-potent, poisonous, narcotic), dosage forms, excipients, etc. They acquire the skills of technological operations: weighing, dosing, mixing, grinding, filtering, dissolving, stabilizing, solubilizing, prolonging, isotoning, calculating the concentration of solutions, higher single and daily doses of medicinal substances, preparing infusions, decoctions, eye drops and other medicinal products.

11. Learning outcomes:

LO1.	Demonstrates knowledge of the main provisions of regulatory documents governing the manufacture, quality control, storage and use of medicines.
LO2.	Organizes the technological process of preparation of medicines, manufactures all types of dosage forms, concentrates, semi-finished products and preparations in accordance with the requirements of regulatory documents of the Ministry of Health of the Republic of Kazakhstan and Good Pharmacy Practice (GPP).
LO3.	Knows and understands a set of values and principles that express the student's honesty in learning when performing written work (essays, essays, test assignments, etc.), answering classes and exams, in research, expressing his position, in relationships with academic staff, teachers and other students.
LO4.	Demonstrates the ability to work with reference and scientific pharmaceutical literature, electronic databases and computer training programs in the field of professional activity.
LO5.	He substantiates his own thoughts through a structured text, stylistically competently builds sentences, correctly indicates literary sources.
LO6.	Is able to transfer knowledge on the development and implementation of innovative technologies in the field of pharmaceutical production to students and other interested parties.

12. Prerequisites: Latin language.

13. Post-requirements: technology of medical and cosmetic products, industrial technology of medicines.

14. Literature

Main:

1. Krasnyuk I.I. Pharmaceutical technology. Technology of dosage forms: textbook / edited by I. I. Krasnyuk, Moscow: GEOTAR – Media, 2015– 656 p.
2. Pharmaceutical technology. Technology of dosage forms: textbook / edited by I.I. Krasnyuk [et al.]. Moscow: GEOTAR - Media, 2018. 656 p.
3. Gavrilov A.S. Pharmaceutical technology. Manufacturing of medicines: a textbook / - Moscow: GEOTAR - Media, 2016. - 760 p.
4. Gavrilov A.S. Pharmaceutical technology. Manufacturing of medicines: a textbook / A.S. Gavrilov. - 3rd ed., revised - Moscow: GEOTAR - Media, 2022. - 864 p.

Additional information:

1. The State Pharmacopoeia of the Republic of Kazakhstan 2.0. – 2nd ed. – Almaty: Zhibek Zholy Publishing House, 2015. – Vol.1. – 720 p.
2. The State Pharmacopoeia of the Republic of Kazakhstan, vol. 2. Almaty: Zhibek Zholy Publishing House, 2009 – 804 p.
3. The State Pharmacopoeia of the Republic of Kazakhstan. Almaty: Zhibek Zholy Publishing House, 2014. Vol. 3. 872 p .
4. Pharmaceutical technology. High-molecular compounds in pharmacy and medicine: a textbook / edited by I.I. Krasnyuk. Moscow: GEOTAR - Media, 2016. 560 p.
5. Pharmaceutical technology. Industrial production of medicines. Vol.1: textbook: in 2 volumes / edited by I.I. Krasnyuk [et al.]. Moscow: GEOTAR - Media, 2020. 352 p.
6. Pharmaceutical technology. Industrial production of medicines. Vol. 2: textbook: in 2 volumes / edited by I.I. Krasnyuk [et al.]. - M.: GEOTAR - Media, 2022. - 448 p.
7. Loyd V. Allen. Pharmaceutical technology. Manufacture of medicines studies. The manual, Moscow: GEOTAR - Media, 2014. 512 p.
8. Sagyndykova B.A., Anarbayeva R.M. Darilerdin darikhanalyk tehnologiyasi: okulyk. - Karaganda: Medet Group, 2021. - 556 bet.
9. Sagyndykova B.A., Anarbayeva R.M. Darilik turlerdin tazhiribelik tehnologiyasi: okulyk. - Karaganda: Medet Group, 2021. - 427 bet.
10. Sagyndykova B.A., Anarbayeva R.M. Darilik turlerdin tazhiribelik tehnologiyasi: okulyk. Almaty: Evero Publ., 2016. 464 bet.
11. Anarbayeva R.M. Darikhanalyk darilik turler tehnologiyasi boyynsha zerthanalyk sabaktarga arналған: oku kuraly - Almaty: Evero, 2016. - 368 bet.
12. Anarbayeva R.M. Darikhanalyk darilik turler tehnologiyasi boyynsha zerthanalyk sabaktarga arналған: oku kuraly Almaty: Evero, 2014. - 364 bet.
13. Anarbayeva R. M. Zhagar mailar tehnologiyasyn zhasau zhane zhetildirude osimdik mailaryn koldanudyn perspektivalary : monograph, 2025

Electronic resources:

1. The UMKD of the discipline is posted on the educational portal of the UCMA <https://ukma.kz>
2. The YUKMA Electronic Library - <https://e-lib.skma.edu.kz/genres>
3. Republican Interuniversity Electronic Library (RMEB) – <http://rmebrk.kz/>
4. Aknurpress Digital Library - <https://www.aknurpress.kz/>
5. The Epigraph Electronic Library - <http://www.elib.kz/>
6. Epigraf - multimedia textbook portal <https://mbook.kz/ru/index/>
7. EBS IPR SMART <https://www.iprbookshop.ru/auth>
8. Information and legal system "Zan" - <https://zan.kz/ru>
9. Medline Ultimate EBSSO
10. eBook Medical Collection EBSSO
11. Scopus - <https://www.scopus.com/>

Online resources:

1. Order of the Minister of Health of the Republic of Kazakhstan dated July 7, 2021 No. KR DSM-58 "On approval of Sanitary Rules "Sanitary and epidemiological requirements for facilities in the field of circulation of medicines and medical devices" <https://adilet.zan.kz/rus/docs/V2100023416>
2. Order of the Minister of Health of the Republic of Kazakhstan dated January 27, 2021 No. KR DSM-11 "On approval of the Rules for labeling medicines and medical devices" <https://adilet.zan.kz/rus/docs/V2100022146#z9>
3. Order of the Minister of Health of the Republic of Kazakhstan dated December 20, 2020 No. KR DSM-286/2020 "On approval of the Rules for the manufacture of medicines and medical products

- by entities in the field of circulation of medicines and medical products licensed to manufacture medicines and medical products" <https://adilet.zan.kz/rus/docs/V2000021840#z6>
4. Order of the Minister of Health of the Republic of Kazakhstan dated December 20, 2020 No. KR DSM-287/2020 "On approval of the rules for conducting intra-pharmacy control of manufactured medicines" <https://adilet.zan.kz/rus/docs/V2000021835#z7>
 5. Order of the Acting Minister of Health of the Republic of Kazakhstan dated February 4, 2021 No. KR DSM-15 "On Approval of good Pharmaceutical practices" <https://adilet.zan.kz/rus/docs/V2100022167#z14>
 6. Pharmacopoeia of the Eurasian Economic Union (EAEU), Volume 1, Part 1. Moscow, Eurasian Economic Commission, 2020 https://eec.eaeunion.org/upload/medialibrary/bd2/Farmakopeya-2020-t1_1.pdf
 7. Pharmacopoeia of the Eurasian Economic Union (EAEU), Volume 1, Part 2. Moscow, Eurasian Economic Commission, 2023 <https://eec.eaeunion.org/upload/medialibrary/9de/2-chast-1-toma-Farmakopei-Soyuza-s-vozmozhnostyu-poiska.pdf>
 8. Pharmacopoeia of the Eurasian Economic Union (EAEU), Volume 1, Part 3. Moscow, Eurasian Economic Commission, 2024 https://eec.eaeunion.org/upload/medialibrary/6e6/xponnslaimcy12pg22o1r4t7jy2kttla/3-ch-I-Toma-FS-s-vozmozhnostyu-poiska_-22.07.24.pdf 9.

1. Department: Drug Technology and Pharmacognosy

2. Level of education: Bachelor's degree

3. Educational program: Pharmaceutical manufacturing technology

4. Year of study: 3

5. Name of the elective discipline: Fundamentals of pharmaceutical technology

6. Number of credits: 5

7. The purpose of the discipline: The formation of skills in the preparation of medicines by giving them a certain dosage form.

8. Content of the discipline:: Technology of preparation of powders, liquid dosage forms (aqueous and non-aqueous solutions, IUD solutions, suspensions, emulsions, infusions and decoctions), soft dosage forms (ointments, suppositories), sterile and aseptically prepared dosage forms (solutions for injection, eye ointments and drops) Technology of preparation of powders, liquid dosage forms (aqueous and non-aqueous solutions, IUD solutions, suspensions, emulsions, infusions and decoctions), mild dosage forms (ointments, suppositories), sterile and aseptically prepared dosage forms (solutions for injection, eye ointments and drops).

9. Objectives:

- mastering the theoretical foundations of the technology of dosage forms;
- obtaining professional skills and manufacturing skills of dosage forms;
- implementation of intra - pharmacy control of pharmaceutical dosage forms;
- training in the use of regulatory documents (orders, instructions and pharmacopoeia articles of the Republic of Kazakhstan) in the preparation of medicines.

10. Justification of the choice of the discipline: When studying this subject, students for the first time gain knowledge about the following concepts: medicine, medicinal substance, dosage form, drug, medicinal product, technological process, stages, operations, classification of medicinal products (potent, non-potent, poisonous, narcotic), dosage forms, excipients, etc. They acquire the skills of technological operations: weighing, dosing, mixing, grinding, filtering, dissolving, stabilizing, solubilizing, prolonging, isotoning, calculating the concentration of solutions, higher single and daily doses of medicinal substances, preparing infusions, decoctions, eye drops and other medicinal products.

11. Learning outcomes:

LO1	Demonstrates knowledge of the main provisions of regulatory documents regulating the manufacture, quality control, storage and use of medicines.
LO2	Organizes the technological process of preparation of medicines, manufactures all types of dosage forms, concentrates, semi-finished products and preparations in accordance with the requirements of regulatory documents of the Ministry of Health of the Republic of Kazakhstan and Good Pharmacy Practice (GPP).

LO.	Knows and understands a set of values and principles that express the student's honesty in learning when performing written work (essays, essays, test assignments, etc.), answering classes and exams, in research, expressing his position, in relationships with academic staff, teachers and other students.
LO4	PO4. Demonstrates the ability to work with reference and scientific pharmaceutical literature, electronic databases and computer training programs in the field of professional activity.
LO5	Substantiates his own thoughts through a structured text, stylistically competently builds sentences, correctly indicates literary sources.
LO6	Is able to transfer knowledge on the development and implementation of innovative technologies in the field of pharmaceutical production to students and other interested parties.

12. Prerequisites: Latin language.

13. Post-requirements: technology of medical and cosmetic products, industrial technology of medicines.

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9. Sagyndykova B.A., Anarbayeva R.M. Darilik turlerdin tazhiribelik technologiysy: okulyk. - Karaganda: Medet Group, 2021. - 427 bet.
10. Sagyndykova B.A., Anarbayeva R.M. Darilik turlerdin tazhiribelik technologiysy: okulyk. Almaty: Evero Publ., 2016. 464 bet.
11. Anarbayeva R.M. Darikhanalyk darilik turler technologiysy boyynsha zerthanalyk sabaktarga arnalgan: oku kuraly - Almaty: Evero, 2016. - 368 bet.
12. Anarbayeva R.M. Darikhanalyk darilik turler technologiysy boyynsha zerthanalyk sabaktarga arnalgan: oku kuraly Almaty: Evero, 2014. - 364 bet.
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4. Aknurpress Digital Library - <https://www.aknurpress.kz/>
5. The Epigraph Electronic Library - <http://www.elib.kz/>
6. Epigraf - multimedia textbook portal <https://mbook.kz/ru/index/>
7. EBS IPR SMART <https://www.iprbookshop.ru/auth>
8. Information and legal system "Zan" - <https://zan.kz/ru>
9. Medline Ultimate EBSSO
10. eBook Medical Collection EBSSO
11. Scopus - <https://www.scopus.com/>

Online resources:

1. Order of the Minister of Health of the Republic of Kazakhstan dated July 7, 2021 No. KR DSM-58 "On approval of Sanitary Rules "Sanitary and epidemiological requirements for facilities in the field of circulation of medicines and medical devices" <https://adilet.zan.kz/rus/docs/V2100023416>
2. Order of the Minister of Health of the Republic of Kazakhstan dated January 27, 2021 No. KR DSM-11 "On approval of the Rules for labeling medicines and medical devices" <https://adilet.zan.kz/rus/docs/V2100022146#z9>
3. Order of the Minister of Health of the Republic of Kazakhstan dated December 20, 2020 No. KR DSM-286/2020 "On approval of the Rules for the manufacture of medicines and medical products by entities in the field of circulation of medicines and medical products licensed to manufacture medicines and medical products" <https://adilet.zan.kz/rus/docs/V2000021840#z6>
4. Order of the Minister of Health of the Republic of Kazakhstan dated December 20, 2020 No. KR DSM-287/2020 "On approval of the rules for conducting intra-pharmacy control of manufactured medicines" <https://adilet.zan.kz/rus/docs/V2000021835#z7>
5. Order of the Acting Minister of Health of the Republic of Kazakhstan dated February 4, 2021 No. KR DSM-15 "On Approval of good Pharmaceutical Practices" <https://adilet.zan.kz/rus/docs/V2100022167#z14>
6. Pharmacopoeia of the Eurasian Economic Union (EAEU), Volume 1, Part 1. Moscow, Eurasian Economic Commission, 2020 https://eec.eaeunion.org/upload/medialibrary/bd2/Farmakopeya-2020-t1_1.pdf
7. Pharmacopoeia of the Eurasian Economic Union (EAEU), Volume 1, Part 2. Moscow, Eurasian Economic Commission, 2023 <https://eec.eaeunion.org/upload/medialibrary/9de/2-chast-1-toma-Farmakopei-Soyuza-s-vozmozhnostyu-poiska.pdf>
8. Pharmacopoeia of the Eurasian Economic Union (EAEU), Volume 1, Part 3. Moscow, Eurasian Economic Commission, 2024 <https://eec.eaeunion.org/upload/medialibrary/6e6/xponnslaimcy12pg22o1r4t7jy2kttla/3-ch-I-Toma-FS-s-vozmozhnostyu-poiska-22.07.24.pdf>

1. Department of Pharmacognosy

2. Level of training (Bachelor's degree)

3. Educational program: 6B07201- " Technology of pharmaceutical production»

4. Course: 3

5. Name of elective discipline: "Chemistry of natural medicinal compounds»

6. Number of credits: 5 credits (150 hours)

7. Purpose: to form the necessary knowledge, skills and abilities of future specialists in the rational, scientifically-based procurement of medicinal plant raw materials, carrying out its standardization and quality control, as well as through the use and application in practice of medicinal products of plant origin

8. Content of the discipline: General laws and regularities of the chemistry of natural compounds. Classification of biological active substances, distribution and accumulation of biological active substances in plants. Methods for determining the structure, extraction of medicinal substances from plant sources, separation, purification and identification of biological active substances.

9. Tasks:

* to give students knowledge about the botanical, pharmacognostic characteristics, chemical composition of medicinal plants (LR) and medicinal plant raw materials(LRS), ways of its use by the phytoproduction industry;

- * teach students to use the methods of pharmacognostic and commodity analysis of medicinal plant raw materials, standardization at various stages of procurement and use;
- * teach students to determine the methods of rational harvesting of LRS, stocks of wild plants in connection with the ever-growing needs of the domestic pharmaceutical industry in high-quality medicinal plant raw materials.
- * formation of students' knowledge of phytochemistry of medicinal plants, physical and chemical properties of extractants and solvents, practical skills in the implementation of the technological process of preparation of extraction and complex pharmaceutical preparations with the use of modern equipment and new technologies.

10. Justification of the choice of discipline:

Taking into account the increased requirements of practical pharmacy and medicine for the use of medicinal raw materials of plant, animal and mineral origin, the subject "Chemistry of natural medicinal compounds" considers a range of issues related to the effectiveness of quality control at all stages of drug development. Ensuring the proper quality of medicinal plant raw materials largely depends on the proper organization of control, its effectiveness and efficiency, as well as on the level of requirements laid down in regulatory documents (GF, RD, VARD) and the methods of analysis used. The study of the system of quality standards of medicinal raw materials, their products, testing methods, etc., established in the national order and mandatory for manufacturers and consumers is currently an urgent problem in the Republic of Kazakhstan.

11. Learning outcomes (competencies):

Knowledge (cognitive sphere)	Skills and abilities (psychomotor sphere)	Personal and professional competencies (relationships)
- general laws and regularities of the chemistry of a natural compound; - classification of biological active substances, distribution and accumulation of biological active substances in plants; - apply methods of separation, purification and identification of natural medicinal compounds, formalize the results of laboratory work and draw appropriate conclusions based on them;	- the results of educational experiments, observed facts and phenomena, their causal relationships from a scientific point of view and the maximum yield of biologically active substances from natural sources; - collects information, evaluates and interprets the results of educational experiments, explains the accumulation of biological active substances in medicinal plants; works in a group and solves assigned tasks; - organize production areas and storage areas, maintain documentation in accordance with the RD, GF specifications for raw materials and monitor the quality of plant raw materials, depending on the nature of the PRM;	- Collects information, evaluates and interprets the results of educational and scientific experiments in the field of chemistry of medicinal natural compounds; - evaluates modern achievements of science and the field of pharmacy, compiles reviews and reports, prepares scientific publications - Capable of analyzing medicinal compounds in medicinal plant raw materials - Adheres to the principles of academic integrity and learning behavior in the performance of written works, answers to exams

12. Prerequisites: Processes and devices of chemical and pharmaceutical production

13. Post-requirements: technology of extraction preparations

16. Literature

The main:

15. Табиғи дәрілік заттардың химиясы : оқулық / Ә. Қ. Патсаев. –Шымкент :Әлем, 2016. – 188 бет с.
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21. Жангозина Д.М. м.ғ.д. Дәрілікөсімдіктер және дәрілікөсімдікшікізаты: оқу құралы – Алматы: «Эверо» баспасы, 2020. – 240б. https://www.elib.kz/ru/search/read_book/742/

1. Department: Engineering disciplines

2. level of education: bachelor's degree

3. Name of the educational program 6B07201-Technology of Pharmaceutical production

4. Course: 4

5. Name of the elective discipline «Labor protection and safety regulation»

6. Number of credits: 5

7. Purpose: Formation of knowledge requirements and regulations "Labor protection and safety regulation" for the preservation of life and health in the process of implementation of training work activities.

8. The content of the discipline:

Normative-legal documents of labor protection and safety. Requirements of safety and labor protection in the design and construction of pharmaceutical enterprises, industrial buildings, industrial, warehouse, ancillary facilities, laboratory control areas, corridors, etc. in accordance with the requirements of the standard GMP. The safety of pharmaceutical process equipment

9. Tasks:

In the conditions of pharmaceutical production, prevention of potential harmful and dangerous effects on employees.

10. Justification of the choice of discipline:

Conducting preventive measures at a pharmaceutical enterprise to protect against potential health and life-threatening factors for employees.

11. Learning outcomes (competencies):

LO1	Demonstrates knowledge and understanding of occupational health and safety issues at pharmaceutical enterprises in accordance with the requirements of regulatory and technical documentation and international standards.
LO2	Demonstrates knowledge of the norms and rules of the Labor Code of the Republic of Kazakhstan, regulatory legal acts of the Republic of Kazakhstan and industry standards of the pharmaceutical industry in the field of occupational safety and health.
LO3	Applies the norms and rules to ensure occupational safety and health at a professional level for the organization of gasoline-hazardous technological processes at pharmaceutical enterprises.
LO4	Organizes and manages employees of a pharmaceutical enterprise for the safe implementation of technological processes and the use of equipment.
LO5	Ensures the organization and safety of technological processes and the use of equipment, monitors the working condition of premises and the production environment, monitors compliance with the requirements set out in the regulatory legal acts of the Republic of Kazakhstan and industry standards in the implementation of technological processes.
LO6	Identifies harmful and dangerous factors, potential risks affecting the life and health of a pharmaceutical production worker, identifies the causes of industrial accidents, suggests ways to solve occupational safety and health issues based on the use of industrial information in conditions of choice and diversity of possibilities, and assumes responsibility for them.
LO7	Carries out collection, processing and scientifically based analysis to carry out organizational and technical measures to create a safe environment during the technological processes of pharmaceutical production, assesses the safety of the production environment, demonstrates the ability to conduct research / experimental work on the introduction of new ways to prevent accidents at work.

12. Prerequisites: Technology of extraction preparations, Pharmaceutical biotechnology the basics of Microbiology

13. Postrequisites: Undergraduate practice, graduation project

14. Reference:

1. Panasenko A.I., Buryak V. P., Kremzer A. A. Labor protection in the pharmaceutical industry. - Zaporozhe: ZSMU, 2015. - 102 p.
2. Belyakov G. I. Work safety and safety technology: textbook for applied bachelor's degree. - 3rd ed. - M.: Publishing house Yurayt, 2016. - 404 p.

1. Department of Organizations and management of pharmaceutical business

2. Bachelor course

3. Educational program 6B07201 - "Pharmaceutical Production Technology"

4. Course 4

5. Name of the elective discipline Marketing and management of pharmaceutical production

6. Number of credits 5

7. Objectives: Formation of students' system of knowledge, skills, and professional competencies in the field of pharmaceutical marketing and management, aimed at effective management of the life cycle of medicines, production processes, product quality, and their promotion in the pharmaceutical market, taking into account GMP requirements and the competitive environment.

8. Justification of the choice of discipline:

Modern marketing concepts in the pharmaceutical industry. Marketing environment of a pharmaceutical enterprise. Marketing mix (4P) in the context of pharmaceutical production. Analysis and forecasting of the pharmaceutical market. Segmentation of the pharmaceutical market based on the enterprise's production capabilities. Product policy of a pharmaceutical enterprise: drug life cycle, assortment management, development and launch of new drugs (R&D). Pricing of medicines taking into account production costs, pharmacoeconomic indicators and state regulation. Sales policy of a pharmaceutical manufacturer: distribution channel management, logistics and supply chain management. Marketing communications in the pharmaceutical industry. Marketing research in pharmaceutical production. Theoretical and methodological foundations of management in pharmaceutical production. Management of production processes based on GMP principles. Making management decisions in conditions of uncertainty and risk. Management of personnel in pharmaceutical production. Leadership and management styles in production teams. Quality and risk management in pharmaceutical production.

9. Tasks:

- to form an understanding of the essence and role of marketing in pharmaceutical production;
- to study the features of product policy and management of the range of medicines;
- to master the principles of pricing, taking into account production and market factors;
- to teach the development and implementation of strategies for the promotion of pharmaceutical products;
- to form the skills of analysis of the pharmaceutical market (capacity, potential, competition);
- to study the organization of sales activities of a pharmaceutical manufacturer;
- to master the methods of conducting marketing research in the pharmaceutical industry;
- to learn the basics of strategic and operational planning in pharmaceutical production;
- to develop the skills of making managerial decisions;
- to learn the principles of personnel management in production;
- to master the methods of motivation and increasing labor efficiency;
- to form an understanding of modern approaches to quality management (GMP);
- to develop the skills of choosing the best managerial decisions in the production environment.

10. Justification of the choice of discipline:

In the context of high competition and globalization of the pharmaceutical market, the effectiveness of pharmaceutical manufacturing enterprises is determined by the level of implementation of modern approaches to management, marketing, and product quality. Pharmaceutical manufacturing management is a comprehensive system for managing the production, technological, and human resources of an enterprise, aimed at ensuring the production of high-quality, safe, and competitive medicines in accordance with international GMP standards. Marketing in pharmaceutical production is a strategic management tool that ensures the adaptation of an enterprise's activities to market requirements, the formation of sustainable competitive advantages, and the effective promotion of pharmaceutical products at the national and

international levels. This discipline integrates technological knowledge with management and marketing competencies, which is a key requirement for modern pharmaceutical professionals.

11.Learning outcomes (competencies)

Student:

- demonstrates systemic knowledge in the field of marketing and management of pharmaceutical production, including GMP principles, quality management and the life cycle of medicines;
- analyzes the pharmaceutical market, determines its capacity and potential, taking into account the production capabilities of the enterprise;
- develops and implements the product, pricing, and sales policy of a pharmaceutical manufacturer;
- applies marketing research methods to assess the effectiveness of the enterprise's activities;
- makes informed management decisions in the field of production organization and management;
- applies the principles of personnel management, motivation, and leadership in production teams;
- collects, processes, and interprets marketing and production information;
- develops recommendations for improving the efficiency of pharmaceutical production and drug promotion;
- demonstrates teamwork skills, professional communication, and interaction with pharmaceutical market participants;
- complies with professional, ethical, and regulatory requirements in pharmaceutical activities.

12.Prerequisites: The pharmaceutical industry economy and digitalization processes.

13.Post-requirements: Professional activity.

14. Literature

Main:

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2. Шертаева, К. Д. Фармацевтикалық маркетинг [Мәтін] :оқулық / К. Д. Шертаева, К. Ж. Мамытбаева ; ҚР денсаулық сақтау және әлеуметтік даму министрлігі. ОҚМФА. - Шымкент : [б. и.], 2016. - 152 б. с.
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5. Блинова, О. В. Фармацевтический менеджмент: учебник / О. В. Блинова ; М-во здравоохранения РК; ЮКГФА. - Шымкент :Жасұлан, 2013. - 165 с
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Электронные ресурсы

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5. Эпиграф - портал мультимедийных учебников<https://mbook.kz/ru/index/>
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8. Cochrane Library - <https://www.cochranelibrary.com/>

1. Department: Pharmaceutical Production Technologies

2. Level of education: Bachelor's degree

3. Name of the educational program: 6B07201-Pharmaceutical Production Technology

4. Course: 3

5. Name of the elective discipline: "Development of design and estimate documentation and business plan»

6. Number of credits: 5

7. Purpose: to give the student the basics of business planning and drawing up design and estimate documentation for solving problems: the student must acquire knowledge and skills in preparing and solving engineering and economic problems in business; get acquainted with the basic mathematical methods for solving problems.

8. The content of the discipline: Fundamentals of Marketing. Study of the pharmaceutical industry market. SMART goal setting. Business idea evaluation. Market analysis. SWOT analysis. Preparation of design and estimate documentation. Feasibility study, calculation and analysis of predicted technical and economic indicators. The main sections of the business plan. Methodology for compiling a business plan for pharmaceutical companies. Project summary. Description of the product or service. Organizational and managerial plan. Development of a financial plan. Defense and presentation of the business plan.

9. Tasks:

- acquire skills in the functional responsibilities of the designer, the use and completion of the necessary documentation;
- using regulatory and technical documents to design the overall structure of the workshop, and the traffic flows in it.

10. Justification of the choice of discipline: Bachelors in the specialty 6B07201-Technology of pharmaceutical production trajectories "Maintenance of technological equipment" must perform the following types of professional activities •

- Analysis of the market and the pharmaceutical industry
- Determination of the procedure for development, approval, approval and composition of design documentation for construction
- Choice of tax regime.
- Calculation of taxes, socio-economic effect and analysis of project risks
- Carrying out financial calculations in Excel. Drawing up a financial model of a business plan
- Preparation of pre-project documentation containing the main initial data with descriptions of the purpose of investment
- Justification of investment efficiency, including: expected economic, social and commercial effect from the operation of the facility
- Description of the production and technological process
- Information about the main technical and technological parameters of the construction object and calculations with the determination of the technical and economic indicators of the object
- Forecast of sales volumes, balance of cash costs and receipts
- Calculation of fixed and variable costs
- Determination of product profitability, types of project risks
- Types and methods of risk reduction

11. Learning outcomes (competencies):

LO 1	Knows the basic concepts and terms, features of the development of design and estimate documentation and a business plan in the field of pharmaceutical production
LO 2	Knows the methodology for developing a business plan and the mechanism for obtaining permits for the construction, operation and technical conditions for the infrastructure of enterprises, accounting for costs and profits in the field of pharmaceutical production, as well as measures of state support for SMEs

LO 3	Able to draw up a marketing, organizational and managerial, production, technological and financial plan for pharmaceutical production, as well as a predictive calculation of design estimates
LO 4	Able to process information for further application in the field of pharmaceutical production, demonstrates knowledge of searching, collecting, storing and processing information for scientific purposes and professional activities.
LO 5	Assesses the ability to work in small groups, jointly solve tasks. setting SMART goals, evaluating business ideas and analyzing the market.
LO 6	Able to present personal judgments, arrange in the form of an abstract, presentation and present at laboratory classes, student scientific circles, conferences, etc.
LO 7	Able to transfer to students / teachers / examiners own knowledge and skills in planning and conducting practical work, explain the observed facts and phenomena, their cause-and-effect relationships, methods of conducting scientific research in the field of economics and finance with chemical and technological processes, knowledge on the development of design estimates documentation and business plan in the field of pharmaceutical production

12. Prerequisites: Computer technology in engineering and economic calculations

13. Postrequisites: Undergraduate practice

14. Literature:

1. Арыстанов, Ж. М. Фармацияның басқарылуы және экономикасы [Мәтін] : оқулық / Ж. М. Арыстанов. - Алматы : New book, 2022. - 452 бет.
2. Арыстанов, Ж. М. Фармация саласындағы менеджмент және маркетинг [Мәтін] : оқу құралы / Ж. М. Арыстанов. - Алматы : New book, 2022. - 204 бет.
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4. Dzhakupova, D. Y. Fundamentals of Entrepreneurship [Текст] : training manual = Основы предпринимательства : учебное пособие / D. Y. Dzhakupova. - Ministry of Education and Science Republic of Kazakhstan. - Almaty : Bastau, 2018. - 296
5. Жакипбеков, К. С. Формирование системы оценки привлекательности и эффективности инновационных проектов в фармацевтическом производстве [Текст] / К. С. Жакипбеков. - Караганда : АҚНҰР, 2017.
6. Николас, Дж. Бизнес және заң. 1 т. [Мәтін] : оқулық / Дж. Николас. - 3-бас. - Алматы : Дәуір, 2017. - 468 б. с.
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8. Шертаева, К. Д. Кәсіпкерлік қызмет негіздері [Мәтін] : оқулық / К. Д. Шертаева, О. В. Блинова, Ж. К. Шимирова. - Шымкент : ОҚМА, 2019. - 151 бет. С
9. Шертаева, К. Д. Фармацевтикалық маркетинг [Мәтін] : оқулық / К. Д. Шертаева, К. Ж. Мамытбаева ; ҚР денсаулық сақтау және әлеуметтік даму министрлігі. ОҚМФА. - Шымкент : [б. и.], 2016. - 152 б. С
10. Моллах Хамид Управление рисками в фармацевтическом производстве : монография / М. Лонг, Г. Бейсмен, пер. с англ. под общ. ред. А. В. Александровой. - 2-е изд. испр. - М. : ВИАЛЕК, 2017. - 464 с
11. Утегенова Г.И. Фармацевтикалық өнеркәсіп экономикасы :оқулық –Жасулан -2022
12. Утегенова Г. И. Экономика фармацевтической промышленности: учебник-Жасулан -2022

1. Department: Pharmaceutical Production Technologies

2. Level of education: Bachelor's degree

3. Name of the educational program: 6B07201-Pharmaceutical Production Technology

4. Course: 3

5. Name of the elective discipline: «Pharmaceutical biotechnology the basics of Microbiology»

6. Number of credits: 4

7. Purpose: students' study of the discipline "pharmaceutical biotechnology" is aimed at training specialists in the field of pharmaceutical production. The program provides students with the practical skills necessary for analytical thinking and performing professional tasks in the field of pharmaceutical technologies.

8. The content of the discipline: Objects of medical biotechnology. General characteristics of the biotechnological process. The use of cell culture in biotechnological production. GMP system of production and quality control of medicinal products of biotechnological production. Recombinant DNA technology or genetic engineering in medical biotechnology. Biotechnology of steroid hormones, antibiotics, enzymes, vitamins, amino acids. The conditions of cultivation.

9. Tasks:

- cellular engineering. Application of cell engineering methods in the creation of biological objects.
- cultivation of cells and tissues of plants and animals.
- preparation of medicines based on tissue plant cultures.
- biotechnology of primary metabolites. Production of amino acids and vitamins by biotechnological methods.
- recombinant proteins and polypeptides. Insulin. Growth hormone. Erythropoietin. Determination of peptide growth factors.
- quality control of medical immunobiological preparations.

10. Justification of the choice of discipline: bachelors studying in the trajectories "maintenance of technological equipment of pharmaceutical production" and "design of pharmaceutical production" in the specialty 6b07201-technology of pharmaceutical production should perform the following types of professional activities:

- Preparation of medicines in accordance with the requirements of the NTD and GMP standards;
- The right choice of packaging materials for the manufacture of primary packaging for LF;
- The correct choice of types of packaging, capping agents and dosing devices for specific drugs, taking into account the physico-chemical and technological properties of drugs and short-circuit devices;
- The right choice of machines and automatic machines for disassembling and packaging specific explosives, taking into account the physical, chemical and technological properties of drugs and short-circuit equipment;
- Assessment of the quality of packaging and packaging for DDZ;
- correct design, labeling and labeling of packaged pharmaceutical and medical products,
- calculation of the consumption rates of packaging materials and economic efficiency;
- Analysis of the state of technological equipment for packaging and packaging of DT, MMB/SMB;

11. Learning outcomes (competencies):

PO1	An in-depth study of the theoretical and practical foundations of the achievements of biomedical science, biochemistry and molecular biology and knowledge of new technologies in the field of medical biotechnology, modern diagnostic tools, biocompatible materials and cellular technologies.
PO2	Knowledge of the main and priority areas of development of general and medical biotechnology, the main sources of medicinal, diagnostic, preventive agents and related products, as well as innovative biotechnological methods and ways to improve drug producers and biotechnological processes.
PO3	To be able to put into practice theoretical knowledge about the main biotechnological methods used in the field of translational and practical medicine.
PO4	Knowledge of the functioning of the general scheme of biotechnological production, obtaining highly efficient producers.
PO5	Knowledge of the main equipment used in the industrial practice of biotechnological production.
PO6	Development of microbial technology for obtaining various amino acids, quality control of amino acids, chemical and chemical-enzymatic synthesis of amino acids, industrial types of bioreactors for immobilized enzymes and producer cells.

12. Prerequisites: "Processes and devices of chemical and pharmaceutical production", "Latin language", "Technology of extraction preparations", Production practice.

13. Postrequisites: "Good manufacturing practice and rules for waste-free production", Machines and automata for disassembling and packaging of dosage forms, Pre-graduate practice, completion of a diploma project.

14.Literature:

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4. Гаврилов, А. С. Фармацевтическая технология. Изготовление лекарственных препаратов: учебник / - М. : ГЭОТАР - Медиа, 2016.-760с.
5. Сағындықова, Б. А. Дәрілік түрлердің тәжірибелік технологиясы: оқулық / - Алматы: Эверо, 2016. - 464 бет с.
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Department: Pharmaceutical Production Technologies

2. Level of education: Bachelor's degree

3. Name of the educational program:6B07201-Pharmaceutical Production Technology

4. Course: 3

5. Name of the elective discipline:"Industrial Drug technology»

6. Number of credits: 6

7. Objective:To study the theoretical foundations and acquire professional skills for the preparation of dosage forms in production conditions, taking into account the intermediate links of general engineering and profile disciplines, step control, biopharmaceutical evaluation, improvement and development of new dosage forms with effective therapeutic activity. Responsibilities: it consists in simultaneously ensuring the convenience of employees and their working capacity, minimal elimination of their injuries or diseases.

8. The content of the discipline: Classification of finished dosage forms (DF). Industrial production of solid dosage forms Industrial production of sterile dosage forms - GMP requirements for production facilities. Industrial production of soft dosage forms. Biopharmacy as an integral part of drug technology. pharmaceutical factors. Applied value of biopharmaceutical research.

9. Tasks:

- get acquainted with the general technological concepts and terms, as well as the classification of finished dosage forms (FDF);
- to master the theoretical foundations of the production process of FDF;
- master modern special equipment for technological processes,
- master the methods and techniques of stage-by-stage control of the technological process,
- to master the methods and techniques of standardization and quality assessment of FDF and semi-finished products;
- to master the methods and techniques of biopharmaceutical analysis of FDF.

10. Justification of the choice of discipline:

- familiarization with general technological concepts and terms, as well as the classification of finished dosage forms (FDF) ;
- Mastering the theoretical foundations of the FDF production process;
- mastering of modern equipment for technological processes;
- mastering modern methods and techniques of step control during the technological process;
- Mastering modern methods and techniques for standardization and quality assessment of DDT and intermediates;
- Mastering modern methods and techniques of biopharmaceutical evaluation of DDT.

According to the state standard of the Republic of Kazakhstan, the content of this discipline

includes a full course of biopharmaceuticals. Biopharmaceuticals are the final part of drug technology. This science justifies the biopharmaceutical aspects of improving known drugs and studying new dosage forms that have maximum therapeutic effectiveness with minimal side effects.

11. learning outcomes (competencies):

LO1	Demonstrates the basic technological concepts and terms of industrial production of FDF, regulatory documentation, classification and properties of excipients permitted for use in the production of FDF in the Republic of Kazakhstan and theoretical patterns of drug production.
LO2	Performs work with literature, electronic databases and computer learning programs, prepares and presents information in various forms (drawings, graphs, diagrams, tables) and on various media (paper, electronic version), including in the form of presentations in classes, scientific clubs, seminars.
LO3	Conducts the selection of explosives in the production of FDF, the calculation of the initial components for the preparation of tableted, ampouled and other FDF, the choice of technological equipment for the production of a particular type of FDF, the choice of machines and apparatus for their filling and packaging.
LO4	Able to collect and interpret information on the substantiation of the nature and quantity of excipients in the production of FDF and arrange it in the form of a technological and instrumental scheme and present it at laboratory classes, conferences, seminars, etc.
LO5	Assesses the ability to work in small groups, jointly solve tasks.
LO6	Able to transfer to students / teachers / examiners and other interested parties own knowledge and skills in planning and conducting laboratory work, explain the observed facts and phenomena, their cause-and-effect relationships, methods of conducting scientific research in the field of pharmaceutical production

12. Prerequisites: Processes and devices of chemical and pharmaceutical production 1-2, Technology of extraction preparations, Production practice

13. Postrequisites: Special drug technology and pharmacology basics, Machines and automatos for filling and packaging dosage forms, Good manufacturing practice and zero waste principles, Pregraduate practice.

14. Literature:

1. Гаврилов, А. С. Фармацевтическая технология. Изготовление лекарственных препаратов [Текст] : учебник / А. С. Гаврилов. - 2-е изд., перераб. ; - М. : ГЭОТАР - Медиа, 2016. - 760 с.
2. Сағындыкова, Б. А. Дәрілердің дәріханалық технологиясы [Мәтін] : оқулық / Б. А. Сағындыкова, Р. М. Анарбаева. - Алматы : MedetGroup, 2021
3. Сағындыкова, Б. А. Биофармация және дәрілік препараттарды биофармацевтік зерттеу : оқу құралы / - Қарағанды : MedetGroup, 2021. - 172 б
4. Сағындыкова, Б. А., Анарбаева Р.М. Дәрілердің дәріханалық технологиясы: оқулық. - Алматы: MedetGroup, 2021
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6. Фармацевтическая технология. Промышленное производство лекарственных средств. Т. 1 : учебник: в 2-х томах / под ред. И. И. Краснюка [и др.]. - М. : ГЭОТАР - Медиа, 2020. - 352 с. : ил.
7. Фармацевтическая технология. Промышленное производство лекарственных средств. Т. 2 : учебник: в 2-х томах / под ред. И. И. Краснюка [и др.]. - М. : ГЭОТАР - Медиа, 2022. - 448 с. : ил.
8. Дәрілік заттардың өнеркәсіптік технологиясы : оқу құралы / С. К. Кабиева, Р. Қ. Жаслан. - Алматы : Эпиграф, 2022. - 124 б. с
9. Фармацевтическая технология. Технология лекарственных форм : учебник / под ред. И. И. Краснюка [и др.]. - М. : ГЭОТАР - Медиа, 2018. - 656 с. : ил. (Шифр 615.45/Ф 247-542849)
10. Дәрілік түрлердің тәжірибелік технологиясы : оқулық / Б. А. Сағындыкова, Р. М. Анарбаева. - Қарағанды : Medet Group, 2021. - 427 бет с. (Шифр 615.45(075)/С14-405097)

1. Department: Pharmaceutical Production Technologies

2. Level of education: Bachelor's degree

3. Name of the educational program: 6B07201-Pharmaceutical Production Technology

4. Course: 4

5. Name of the elective discipline: «Machines and automatos for filling and packaging dosage forms»

6. Number of credits: 6

7. Purpose: to train students in the field of Pharmaceutical Production Technology, to acquaint students with the device and basic principles of operation of machines and automatic machines for packaging dosage forms and medical (and sanitary) products.

8. The content of the discipline: Basic concepts of containers and packaging. Basic requirements Standard requirements for packaging and containers for FDF, special requirements for packaging. Requirements for the external design of the packaging. Special types of packaging. The main machines and automatic machines for filling and packing DF. Ways to solve the problem of complex mechanization and automation of the processes of packaging and packaging of DF.

9. Tasks:

–mastering theoretical and practical issues related to packaging and packaging for medicinal products and medical devices;

–study of the device and principle of operation, rules of operation of machines and automatic machines for packaging and packaging of finished dosage forms and semi-finished products;

–study of the characteristics of electrical circuits and electrical equipment;

10. Justification of the choice of discipline: Bachelors in the specialty 6B07201-Technology of pharmaceutical production trajectories "Maintenance of technological equipment" must perform the following types of professional activities •

* manufacture of finished medicines in accordance with the requirements of regulatory documents and GMP standards;

* implementation of step-by-step quality control of pharmaceutical products;

* organization of the technological process of production of finished medicines;

• control of the technological process of production of pharmaceutical products;

* implementation of technical control of the production process;

* conducting technical and economic analysis of chemical and pharmaceutical production;

• quality control and standardization of finished medicines;

* organization and provision of input control of raw materials and materials in accordance with the requirements of regulatory documentation.

11. Learning outcomes (competencies):

LO1	Knows the organization of the technological process of packaging, packaging and labeling of medicines; general and standard requirements for containers and packaging, as well as special (special) requirements for packaging for medicinal products
LO2	Knows how to choose packaging materials, types of containers, packaging and closures, dosing nozzles, etc., depending on the type of drug being produced. Selection of filling and packaging technological equipment and production conditions
LO3	Evaluates and interprets the results of studies conducted to improve the technology for the production of dosage forms and their evaluation in a scientific circle, presents the results of the study in the form of an article, reports at scientific conferences
LO4	Able to transfer to students, interested parties own knowledge and skills in working with information (educational, reference, scientific literature) in the field of production, packaging and packaging of pharmaceutical and medical products

12. Prerequisites: Processes and devices of chemical and pharmaceutical production 1-2, , Technology of extraction preparations, Industrial Drug technology.

13. Postrequisites: Pregraduate practice, Writing and defense of diploma projects/works.

14. Literature

1. Дүзелбаев С. Т. Машина тетіктері: Жоғары кәсіптік мамандар даярлайтын техникалық оқу орындарының студенттеріне арналған оқулық / С. Т. Дүзелбаев. - ҚР БҒМ ұсынған. - Алматы : "Бастау", 2016. - 408 б. с

2. Фармацевтическая технология. Промышленное производство лекарственных средств. Т. 1 : учебник: в 2-х томах / под ред. И. И. Краснюка [и др.]. - М. : ГЭОТАР - Медиа, 2020. - 352 с. : ил.
3. Фармацевтическая технология. Промышленное производство лекарственных средств. Т. 2 : учебник: в 2-х томах / под ред. И. И. Краснюка [и др.]. - М. : ГЭОТАР - Медиа, 2022. - 448 с. : ил.
4. Гроссман, В. А. Фармацевтическая технология: учеб. пособие для мед. училищ и колледжей М. : ГЭОТАР - Медиа, 2014. - 320 с
5. Баубеков С.Ж. Электрлік машиналар мен аппараттар: окулык.-Эверо.2013

1. Department: Pharmaceutical Production Technologies

2. Level of education: Bachelor's degree

3. Name of the educational program: 6B07201-Pharmaceutical Production Technology

4. Course: 4

5. Name of the elective discipline: "Good manufacturing practice and non-waste production principles"

6. Number of credits: 6

7. Purpose: "Good manufacturing practices" is to teach students the basic provisions of good practices(GxP), regulatory documents and methodological materials for ensuring the quality of pharmaceutical and medical products.

8. The content of the discipline Good manufacturing practices and principles of waste-free production The concept of good practices in pharmacy. Life cycle of medicinal products (drugs). Methodology of the quality assurance system for medicinal and medical products. Good manufacturing practice (GMP) basic principles. Methodological principles of non-waste/low-waste production. Classification of pharmaceutical industries by type and amount of waste generated. Ways to minimize waste generation, air emissions, hazardous sewers.

9. Tasks:

- mastering the basic concepts and theoretical foundations of the subject methodology;
- history of development of quality systems (quality control, management and quality assurance), the concept of " quality»;
- state regulation in the sphere of circulation of medicinal products (medicines);
- good practices of GCP: GMP, GLP, GPP, GDP;
- validation and certification in the production of pharmaceutical and medical products;
- modern system of registration of medicines.

10. Justification of the choice of discipline:

Bachelors in the specialty 6B07201-technology of pharmaceutical production trajectories "maintenance of technological equipment" must perform the following professional activities:

- manufacturing of finished medicines in accordance with the requirements of regulatory documents and GMP standards;
- implementation of stage-by-stage quality control of pharmaceutical products;
- * organization of the technological process of production of finished medicines;
- control of technological process of production of pharmaceutical products;
- implementation of technical control of the production process;
- conducting technical and economic analysis of chemical and pharmaceutical production;
- quality control and standardization of finished medicines;
- organization and provision of input control

11. Learning outcomes (competencies):

LO1	General technological concepts and terms in the field of pharmaceutical technology of drugs, technology of extractive preparations, special drug technology, pharmacology, pharmaceutical biotechnology with the basics of microbiology, good manufacturing practice (GMP) with the principles of waste-free technologies and pharmaceutical analysis of raw materials and materials, intermediates and finished products.
LO2	Theoretical foundations of general pharmacology, drug transport in the body and factors affecting its speed and completeness

LO3	Theoretical foundations (principles, methods, technological methods) for the creation of drugs with prolonged action, drugs with targeted delivery to the target organ and controlled release of the drug
LO4	Theoretical foundations of the biotechnological production of medicinal substances with the participation of microorganisms, tissue culture and working proteins (enzymes), features of the technology, equipment used and methods for isolating target products
LO5	Features of technology and design of age-related (children's and geriatric) dosage forms
LO6	Theoretical foundations (principles, tasks) in the field of creating waste-free production technologies in the pharmaceutical industry and the use of secondary raw materials
LO7	Basic terms and concepts in the field of QA quality assurance, QC quality control, TQM quality management
LO8	GxP - the main provisions of good practices, including GMP - the basic principles of good manufacturing practice
LO9	Rules of labor protection, industrial sanitation and safety.

12. Prerequisites: Industrial Drug technology, Technology of extraction preparations

13. Postrequisites: Pregraduate practice, Writing and defense of diploma projects/works.

14. Literature

1. Надлежащая практика хранения и транспортирования лекарственных средств. Руководящие принципы и правила Всемирной организации здравоохранения : монография / пер. с англ. под общ. ред. А. В. Александровой. - М. : ВИАЛЕК, 2020. - 644 с
2. Газалиев, А. М. Система обеспечения безопасности и качества лекарственных веществ [Текст] : учебник / А. М. Газалиев, С. К. Кабиева, Л. М. Власова. - Алматы : ЭСПИ, 2021. - 372 бет. с.
3. Фармацевтическая технология. Высокомолекулярные соединения в фармации и медицине : учебное пособие / под ред. И. И. Краснюка. - М. : ГЭОТАР - Медиа, 2016. - 560 с.
4. Сағындықова, Б. А. Дәрілердің өндірістік технологиясы [Мәтін] : оқулық / Б. А. Сағындықова. - Алматы : Эверо, 2011. - 346 бет. с.
5. Гаврилов А. С.
6. Фармацевтическая технология. Изготовление лекарственных препаратов : учебник / А. С. Гаврилов. - 3-е изд., перераб. - М. : ГЭОТАР - Медиа, 2022. - 864 с. : ил.
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8. Фармацевтическая технология. Промышленное производство лекарственных средств. Т. 2 : учебник: в 2-х томах / под ред. И. И. Краснюка [и др.]. - М. : ГЭОТАР - Медиа, 2022. - 448 с. : ил.
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10. Мانتлер С. Н. Процессы и аппараты химической технологии : учебное пособие / С. Н. Мانتлер, Г. М. Жуманазарова. - Министерство образования и науки Республики Казахстан. - Алматы : "Бастау", 2018. - 256 с
11. Химия өндірісінің негізгі процестері мен аппараттары: Зертханалық практикум [Мәтін] : оқу құралы / Ш. Ш. Нұрсейітов. - Алматы : Эверо, 2014. - 140 бет. С
12. Производство лекарственных средств. Химическая технология от R&D до производства : учебное пособие / пер с англ. Д. Дж. ам Энде [и др.], ред. В. В. Береговых. - СПб : ЦОП Профессия, 2015. - 1280 с. : ил.
13. Шертаева К. Д., Мамытбаева К. Ж. Фармацевтикалық логистика: оқулық/ .-Жасулан 2022
14. Шертаева К. Д., Мамытбаева К. Ж. Фармацевтическая логистика: учеб. Пособие/.-Жасулан 2022
15. Тиісті фармацевтикалық практикаларды ұйымдастыру және басқару негіздері : оқулық / К. Д. Шертаева , О. В. Блинова.-Жасулан 2022
16. Организационные и управленческие основы надлежащих практик: учебник / К. Д. Шертаева, О. В. Блинова.-Жасулан 2022

17. Фармацевтическая система качества и надлежащие фармацевтические практики : учебное пособие / Т. А. Арыстанова, Ж. М. Арыстанов. - Караганда : Medet Group, 2021. - 150 с. (Шифр 615.014/А 895-319357)
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19. Фармациядағы қауіпсіздік және сапа : оқу құралы / С. Д. Джидебаева . - Караганда : ТОО "Medet Group", 2021. - 102 бет с. (Шифр 615.1/Д 38-905242)

1. Department: Pharmaceutical Production Technologies

2. Level of education: Bachelor's degree

3. Name of the educational program: 6B07201-Pharmaceutical Production Technology

4. Course: 4

5. Name of the elective discipline: «Special technology of drugs and the basics of pharmacology»

6. Number of credits: 5

7. Purpose: to study the theoretical foundations and acquire professional skills and skills for the preparation of age-related dosage forms, long-acting drugs in the factory, with directed delivery of the drug to the target organ, with a controlled release rate, to improve known and create new dosage forms with high effective therapeutic activity and safety, taking into account intersubject links with specialized and General engineering disciplines.

8. The content of the discipline Achievements of modern pharmaceutical science in the field of creating separate groups of drugs - pediatric, geriatric, with prolonged action, with targeted delivery of drugs to the target organ, with controlled release of drugs in the body. Fundamentals of pharmacology. The value of pharmacology in the process of creating new drugs. Principles of drug classification. The concept of pharmacokinetic and pharmacodynamics of drugs. Applied value of pharmacokinetic research for the industrial production of drugs.

9. Tasks:

- get acquainted with General technological concepts and terms in the field of special medicine technology;
- master the theoretical foundations (principles, methods, technological techniques) of creating long-acting drugs;
- master the basic principles, methods and technological techniques for ensuring the stability of medicines and substances;
- to study modern achievements in the field of creating medicines with targeted delivery of a medicinal substance,
- to study modern achievements in the field of creating medicines with controlled release of a medicinal product;
- to master the features of technology and design of age-related (children's and geriatric) forms;
- to master the theoretical foundations (principles, tasks) in the field of creating waste-free production technologies in the national economy, including in the pharmaceutical industry in the production of extraction preparations, adhesive plaster, packaging materials, etc.;
- principles of using secondary raw materials;
- to master the maximum permissible concentrations of harmful emissions into the atmosphere, harmful waste and solid waste;
- to develop technological equipment to collect the dust fraction in the pharmaceutical industry, etc.

10. Justification of the choice of discipline: Bachelor's degree in 6B07201-Pharmaceutical Production Technology trajectory "design of pharmaceutical production" must perform the following professional activities:

- development of technical specifications for the design of new and modernization of existing technologies, technological processes, technological lines or technological equipment;
- * development of technological regulations for the production of ready-made medicines (laboratory, experimental, industrial, standard);
- development of design and estimate documentation in the production of pharmaceutical and medical products;

* analysis and evaluation of alternative versions of the technological process and individual stages using mathematical models;

* provision and participation in commissioning.

11. Learning outcomes (competencies):

LO1	Demonstrates knowledge of the principles of prolongation, technology and features of the preparation of drugs of prolonged action, principles, chemical physico-chemical and technological methods for ensuring the stability of drugs and medicinal substances.
LO2	Performs technological methods of prolonging the action and ensuring the stability of drugs.
LO3	He owns the basic principles of methods and technological methods for ensuring the stability of medicines and substances, modern achievements in the field of creating medicines with targeted delivery of a medicinal substance.
LO4	Conducts analysis, collection and interpretation of information on the justification of technological methods and methods used in the production of age-related dosage forms, long-acting drugs, to ensure the stability of drugs and their substances, etc.
LO5	Able to prepare and present information in various forms (drawings, graphs, diagrams, tables) and on various media (paper, electronic version), including in the form of presentations in classes, scientific circles, seminars.
LO6	Assesses the ability to work in small groups, jointly solve tasks.
LO7	Able to transfer to students / teachers / examiners own knowledge and skills in planning and conducting laboratory work, explain the observed facts and phenomena, their cause-and-effect relationships. To other interested parties, knowledge on the development and implementation of innovative technologies in the field of pharmaceutical production.

12. Prerequisites: Processes and devices of chemical and pharmaceutical production, Fundamentals of pharmaceutical technology, Technology of extraction preparations, Pharmaceutical biotechnology the basics of Microbiology,

13. Postrequisites: Pre-graduate practice, master's degree courses in the specialty "Technology of pharmaceutical production".

14. Literature:

1. Гаврилов, А. С. Фармацевтическая технология. Изготовление лекарственных препаратов : учебник / - М. : ГЭОТАР - Медиа, 2016. - 760 с
2. Основы фармакологии с рецептурой [Текст]: учебник / М. З. Шайдаров [и др.]. - Астана : Акнұр, 2014. - 406 с
3. Микробқа қарсы дәрілердің фармакологиясы : оқу құралы / Т. А. Муминов [ж/б.] ; қаз. тіл. ауд. Н. М. Малдыбаева. - Алматы : Литер Принт. Казахстан, 2016. - 552 бет
4. Фармакология негіздері және рецептурасы [Мәтін] : оқулық / М. З. Шайдаров [ж/б.]. - Астана : Акнұр, 2014. - 398 бет. С
5. Харкевич Д.А. Основы фармакологии [Текст]: учебник/ Д.А. Харкевич. - 2-е изд.; Рек. Учебно-методическим объединением по мед. и фарм. образованию вузов России. - М. : ГЭОТАР - Медиа, 2015. - 720 с

1. Department: Pharmaceutical Production Technologies

2. Level of education: Bachelor's degree

3. Name of the educational program: 6B07201-Pharmaceutical Production Technology

4. Course: 4

5. Name of the elective discipline: "Design of systems for in-plant material transportation"

6. Number of credits: 4

7. Purpose: The study of the discipline "Design of Systems for In-Plant Material Transportation" by students is aimed at training specialists in the field of pharmaceutical production. The program provides students with the skills to design systems for transporting materials, taking into account the requirements of pharmaceutical technology, GMP standards, and environmental protection requirements.

8. The content of the discipline: Goals and objectives of designing in-plant piping systems and equipment for transporting materials in pharmaceutical production. Horizontal and vertical movement of liquids, gases, and solid materials: pumps, compressors, conveyors, pneumatic transport, etc.

9. Tasks:

- Training in the principles of organizing effective material transportation systems in manufacturing enterprises.
- Mastering methods of analyzing and optimizing material flows within the enterprise.
- Studying the structure and principles of operation of material transportation equipment (conveyors, cranes, load-lifting machines, and automated transportation systems).
- Developing skills in designing production logistics and in-plant transportation systems.
- Learning methods for calculating the technical and economic efficiency of material transportation systems.
- Developing the ability to design transportation systems that comply with safety and occupational health requirements.

10. Justification of the choice of discipline: bachelors studying in the trajectories "maintenance of technological equipment of pharmaceutical production" and "design of pharmaceutical production" in the specialty 6b07201-technology of pharmaceutical production should perform the following types of professional activities:

- Compliance with technical documentation and production requirements when designing in-house material transportation systems.
- Proper selection of equipment and devices for material transportation in accordance with production conditions.
- Selection of transportation methods, means, and devices for specific production, taking into account the physical, mechanical, and technological properties of materials.
- Proper selection of machines and automated systems for in-house transportation, taking into account the properties of materials and production volumes.
- Evaluation of the quality and efficiency of in-house transportation systems.
- Proper organization of the material transportation process, its designation and design in accordance with safety requirements.
- Calculation of costs for transport systems, equipment performance, and economic efficiency.
- Analysis of the technical condition of technological equipment used in in-plant transport systems

11. Learning outcomes (competencies):

PO1	It uses general technological concepts and terms in accordance with the GMP standard glossary in the field of pharmaceutical technology for medicines and medical devices, pharmaceutical production design and equipment, and occupational safety, as well as the glossary for creating waste-free pharmaceutical production.
PO2	Production workshops for pharmaceutical production, indicating internal workshop communications – systems for transporting liquid, solid, and gaseous materials, semi-products, waste/garbage, and ventilation emissions, taking into account the requirements of the Unified System of Design Documentation (USDD), international standards, and national regulations, as well as, if necessary, ensuring sterility, are designed in the form of drawings and schemes.
PO3	In order to ensure the rational and safe operation of internal workshop communications for the transportation of liquid, viscous, solid powdered, and gaseous materials, semi-finished products, waste, and garbage, hydraulic calculations for process pipelines (calculation of the diameters of simple and complex pipelines, optimal selection of shut-off valves, determination of the capacity of pumps of various designs, etc.) are performed in a reasonable manner..

12. Prerequisites: "Processes and Apparatuses of Chemical and Pharmaceutical Production-1-2", "Technology of Extraction Preparations", "Technology of Drug Production", "Occupational Health and Safety", "Fundamentals of Design and Equipment of Pharmaceutical Production", "Industrial Practice".

13. Postrequisites: "Pre-thesis Practice", "Thesis Project", Master's Degree

14.Literature:

1. Торланова Б. О. Надлежащая производственная практика и принципы безотходного производства : учебно-методическое пособие / Б. О. Торланова, Қ. М. Тұрдалы, Б. А. Бахтиярова. - [б. м.] : ЮКМА, 2024. - 85 с. Экземпляры: всего:10

2. Торланова Б. О. Тиісті өндірістік практика (GMP) және қалдықсыз өндірістің қағидалары : оқу-әдістемелік құрал / Б. О. Торланова, Қ. М. Тұрдалы, Б. А. Бахтиярова. - Шымкент : ОҚМА, 2024. - 100 с. Экземпляры: всего:10
3. Сагиндыкова Б. А. Организация производства лекарственных препаратов по GMP : лекционный комплекс / Б. А. Сагиндыкова. - [б. м.], 2025. - 138 с. - Текст. Экземпляры: всего:5
- 4.Болдыш, С. К. Тиісті фармацевтикалық практикалар (GLP, GCP, GMP, GSP, GDP, GPP, GVP) : оқу-әдістемелік құрал / С. К. Болдыш, Г. Т. Мурзалиева. - Қарағанды : Medet Group ЖШС, 2023. - 252 б
- 5.Тиісті фармацевтикалық практикаларды ұйымдастыру және басқару негіздері : оқулық / К. Д. Шертаева , О. В. Блинова.-Жасулан 2022
- 6.Организационные и управленческие основы надлежащих практик: учебник / К. Д. Шертаева, О. В. Блинова.-Жасулан 2022

Department: Pharmaceutical Production Technologies

2. Level of education: Bachelor's degree

3. Name of the educational program: 6B07201-Pharmaceutical Production Technology

4. Course: 4

5. Name of the elective discipline: "Pneumatic Automation in Pharmaceuticals"

6. Number of credits: 4

7. Purpose: The study of the discipline "Pneumatic Automation in Pharmacy" by students is aimed at training specialists in the field of pharmaceutical production. The program provides students with detailed knowledge and practical skills in the design, operation, and maintenance of pneumatic systems with pharmaceutical equipment, which ensure the automation of processes, improve product quality, energy efficiency, reliability, and compliance with the requirements of pharmaceutical production standards and regulations.

8. The content of the discipline: Principles of operation, structure, and application of pneumatic systems in technological processes of drug production. Methods of implementing logic algebra operations using pneumatic elements. Moving objects using pneumatic systems. The article discusses pneumatic automation elements, schemes, automation methods, reliability and safety issues, and examples of integrating equipment to improve the quality and efficiency of pharmaceutical production.

9. Tasks:

- To master the principles of operation of pneumatic automation systems used in pharmaceutical production;
- To study the basic elements of pneumatic devices (compressors, valves, cylinders, regulators, and sensors) and understand their functions;
- To analyze the structure and operation of automated control systems in pharmaceutical production;
- To study the methods of effective use of pneumatic systems used in the production, packaging, and transportation of medicines;
- To develop skills in designing, regulating, and maintaining pneumatic automation systems;
- To master the features of using pneumatic equipment while complying with safety requirements in production.

10. Justification of the choice of discipline: bachelors studying in the trajectories "maintenance of technological equipment of pharmaceutical production" and "design of pharmaceutical production" in the specialty 6b07201-technology of pharmaceutical production should perform the following types of professional activities:

- To master the structure and principles of operation of pneumatic automation systems used in pharmaceutical production;
- Correct selection of pneumatic devices (compressors, pneumatic cylinders, valves, regulators, and sensors) used for automation of production processes;
- Effective application of pneumatic control systems, taking into account the specifics of technological processes;
- Correct use of pneumatic automation elements for controlling the operation of pharmaceutical production equipment;

- Assessment of the quality, reliability, and efficiency of pneumatic automation systems;
- Compliance with production safety requirements and prevention of emergencies during the operation of pneumatic systems;
- Calculation of technical parameters, performance, and economic efficiency of pneumatic automation systems;
- Analysis of the technical condition of pneumatic equipment used in pharmaceutical production and ensuring its stability

11. Learning outcomes (competencies):

PO1	Knows the basic concepts of pneumatic automation, the requirements for pneumatic equipment in pharmaceutical production, the principles of construction and operation of pneumatic systems, and the methods of implementing logic algebra operations using pneumatic elements, as well as the international standard ISO 1219-91.
PO2	Can calculate and analyze pneumatic control systems.
PO3	Can justify technical decisions when developing and using pneumatic systems in pharmaceutical equipment.
PO4	Analyzes the efficiency of the organization and safety of technological processes, maintenance of technological equipment, and monitoring of the working condition of automation tools and measuring instruments, and ensures compliance with documentation requirements in the technological process.
PO5	Uses modern information technologies for searching, collecting, storing, and processing information using applied programs in the field of professional activity.

12. Prerequisites: "Information and communication technologies", Physics, Mathematics. Part I, Mathematics. Part II

13. Postrequisites: Machines and automatic devices for disassembling and packaging medicinal species, control systems for chemical and technological processes (automation). Related disciplines: processes and devices of chemical and pharmaceutical production-1

14.Literature:

1. Арыстанбаев К.Е., Мамбаева А.М. Химия-технологиялық үдерістерді басқару жүйесі./оқу құралы.- Шымкент 2022 ж
2. Арыстанбаев, К. Е. Системы управления химико - технологическими процессами : учебное пособие / К. Е. Арыстанбаев, - Алматы : Эверо, 2020.
3. Мантлер С. Н. Химиялық технологияның процестері және аппараттары : оқулық / С. Н. Мантлер, Ф. М. Жуманазарова. - ҚР БҒМ ұсынған. - Алматы : "Бастау", 2018. - 256 б.
4. Мантлер С. Н. Процессы и аппараты химической технологии : учебное пособие / С. Н. Мантлер, Г. М. Жуманазарова. - Министерство образования и науки Республики Казахстан. - Алматы : "Бастау", 2018. - 256 с.

1. Department: Engineering disciplines

2. level of education: bachelor's degree

3. Name of the educational program 6B07201-Technology of Pharmaceutical production

4. Course: 4

5. Name of the elective discipline «Labor protection and safety regulation»

6. Number of credits: 5

7. Purpose: Formation of knowledge requirements and regulations "Labor protection and safety regulation" for the preservation of life and health in the process of implementation of training work activities.

8. The content of the discipline:

Normative-legal documents of labor protection and safety. Requirements of safety and labor protection in the design and construction of pharmaceutical enterprises, industrial buildings, industrial, warehouse, ancillary facilities, laboratory control areas, corridors, etc. in accordance with the requirements of the standard GMP. The safety of pharmaceutical process equipment

9. Tasks:

In the conditions of pharmaceutical production, prevention of potential harmful and dangerous effects on employees.

10. Justification of the choice of discipline:

Conducting preventive measures at a pharmaceutical enterprise to protect against potential health and life-threatening factors for employees.

11. Learning outcomes (competencies):

LO1	Demonstrates knowledge and understanding of occupational health and safety issues at pharmaceutical enterprises in accordance with the requirements of regulatory and technical documentation and international standards.
LO2	Demonstrates knowledge of the norms and rules of the Labor Code of the Republic of Kazakhstan, regulatory legal acts of the Republic of Kazakhstan and industry standards of the pharmaceutical industry in the field of occupational safety and health.
LO3	Applies the norms and rules to ensure occupational safety and health at a professional level for the organization of gasoline-hazardous technological processes at pharmaceutical enterprises.
LO4	Organizes and manages employees of a pharmaceutical enterprise for the safe implementation of technological processes and the use of equipment.
LO5	Ensures the organization and safety of technological processes and the use of equipment, monitors the working condition of premises and the production environment, monitors compliance with the requirements set out in the regulatory legal acts of the Republic of Kazakhstan and industry standards in the implementation of technological processes.
LO6	Identifies harmful and dangerous factors, potential risks affecting the life and health of a pharmaceutical production worker, identifies the causes of industrial accidents, suggests ways to solve occupational safety and health issues based on the use of industrial information in conditions of choice and diversity of possibilities, and assumes responsibility for them.
LO7	Carries out collection, processing and scientifically based analysis to carry out organizational and technical measures to create a safe environment during the technological processes of pharmaceutical production, assesses the safety of the production environment, demonstrates the ability to conduct research / experimental work on the introduction of new ways to prevent accidents at work.

12. Prerequisites: Technology of extraction preparations, Pharmaceutical biotechnology the basics of Microbiology

13. Postrequisites: Undergraduate practice, graduation project

14. Reference:

1. Panasenko A.I., Buryak V. P., Kremzer A. A. Labor protection in the pharmaceutical industry. - Zaporozhe: ZSMU, 2015. - 102 p.
2. Belyakov G. I. Work safety and safety technology: textbook for applied bachelor's degree. - 3rd ed. - M.: Publishing house Yurayt, 2016. - 404 p.

1. Department: Pharmaceutical Production Technologies

2. Level of education: Bachelor's degree

3. Name of the educational program: 6B07201-Pharmaceutical Production Technology

4. Course: 4

5. Name of the elective discipline: "Control system for chemical and technological process (automation)"

6. Number of credits: 6

7. Purpose: the Main Purpose of the course "chemical and technological process control System" is to teach students the skills and methods of building modern automated chemical and technological process control systems for the production of ready-made medicines.

8. The content of the discipline Structure and functioning of software and hardware complex of automation system. Automatic measuring systems. Types of automatic control systems. General information on industrial automatic control systems in the field of manufacturing technology of fishing lines. Modern software of APCs of chemical and pharmaceutical industries.

9. Tasks:

- improving the technology of medicines with the use of modern automated control systems for technological processes and devices;

- construction of automated control systems for chemical and pharmaceutical productions.

10. Justification of the choice of discipline: Bachelor's degree in 6B07201-Pharmaceutical Production Technology trajectory "design of pharmaceutical production" must perform the following professional activities:

- development of technical specifications for the design of new and modernization of existing technologies, technological processes, technological lines or technological equipment;

- * development of technological regulations for the production of ready-made medicines (laboratory, experimental, industrial, standard);

- development of design and estimate documentation in the production of pharmaceutical and medical products;

- * analysis and evaluation of alternative versions of the technological process and individual stages using mathematical models;

- * provision and participation in commissioning.

11. Learning outcomes (competencies):

PO1	Demonstrates the knowledge required for automated systems of pharmaceutical production, the basic principles for the selection and justification of technical means of automation.
PO2	Performs the simplest operations in the LabVIEW environment, modern software for ACS XTP and industrial controllers.
PO3	Owens the basic principles of control and modeling of chemical-technological processes, selects a mathematical model for individual devices of chemical production.
PO4	Conducts analysis of transient processes, searches, collects, stores and processes information, including computer information, in the field of professional activity.
PO5	Able to present personal judgments on the automated control system of the chemical-technological process, issue it in the form of an abstract, presentation and present it at laboratory classes, student scientific circles, conferences, etc.
PO6	Assesses the ability to work in small groups, jointly solve tasks.
PO7	Able to transfer to students / teachers / examiners own knowledge and skills in planning and conducting laboratory work, explain the observed facts and phenomena, their cause-and-effect relationships, methods for conducting scientific research in the field of automation and control of chemical and technological processes, knowledge on the development and implementation of innovative technologies in the field of automation and control.

12. Prerequisites::Processes and devices of chemical and pharmaceutical production, Electrical engineering fundamentals of industrial electronics and electrical equipment, Modeling of chemical and technological processes.

13. Postrequisites:Writing and defense of diploma projects/works,Disciplines of the magistracy

14. Literature

1. Арыстанбаев К.Е., Мамбаева А.М. Химия-технологиялық үдерістерді басқару жүйесі./оқу құралы.- Шымкент 2022 ж
2. Арыстанбаев, К. Е. Системы управления химико - технологическими процессами [Текст] : учебное пособие / К. Е. Арыстанбаев, - Алматы : Эверо, 2020. - 128
3. Краснов, Е. А. Фармацевтическая химия в вопросах и ответах [Текст] : учебное пособие / Е. А. Краснов, Р. А. Омарова, А. К. Бошкаева. - ; - М. : "Литтерра", 2016. - 352 с
4. Краснов, Е. А. Фармациялық химия сұрақтар мен жауаптар түрінде [Мәтін] : оқу құралы = Фармацевтическая химия в вопросах и ответах : учебное пособие / Е. А. Краснов, Р. А. Омарова, А. К. Бошкаева ; қаз. тіл. ауд. Ж. Қ. Смаилова. - М. : ГЭОТАР - Медиа, 2016. - 704 с.
5. Мантлер С. Н. Химиялық технологияның процестері және аппараттары : оқулық / С. Н. Мантлер, Г. М. Жуманазарова. - ҚР БҒМ ұсынған. - Алматы : "Бастау", 2018. - 256 б.
6. Мантлер С. Н. Процессы и аппараты химической технологии : учебное пособие / С. Н. Мантлер, Г. М. Жуманазарова. - Министерство образования и науки Республики Казахстан. - Алматы : "Бастау", 2018. - 256 с

7. Дүзелбаев С. Т. Машина тетіктері : Жоғары кәсіптік мамандар даярлайтын техникалық оқу орындарының студенттеріне арналған оқулық / С. Т. Дүзелбаев. - ҚР БҒМ ұсынған. - Алматы : "Бастау", 2016. - 408 б.