The catalog of elective disciplines on the 2022-2023 academic year

1. **Department:** Chemical disciplines
2. **Level of training:** bachelor degree
3. **Specialty:** 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. 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.

9. 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.

10. 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;	- 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.	- 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

- - knowledge of thermodynamics of surface phenomena, physical and 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.	- complies with the rules of labor protection and safety, has the skills of safe work in the chemical laboratory, is able to provide first aid.	research work in the field of chemistry.

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

2. Patsaev A. K., V. K. Mamytova, Erimbetova K. M., A. E. buharbaeva Workshop on inorganic chemistry - teaching method. benefit, Shymkent, 2012.

3. Patsaev K. Inorganic chemistry: studies. benefit. - Shymkent, 2007. - 332c.

4. A. Belyaev, V. I. Kuchuk, K. I. Evstratova, N. Kupina Ah. Physical and colloidal chemistry. M.: GEOTAR-Media.2008.

5. 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)

3.Evstratova K. I., Kupina N. A. Malakhova N. E. Physical and colloidal chemistry. M.: Higher school. One thousand nine hundred ninety

4. Krasnov K. S., Vorobyov N. To. Godnev I. N. and others. Physical chemistry. In 2 books. Moscow: Higher school, 2001

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 approaches to their solution at the global, regional and local levels.	- 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; - 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;	- 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

	- 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;	

11. Prerequisites: School program

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

13. Literature

Primary:

1.Kenesariev 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. Guvernsky, 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 Roszdrava, 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

5. The concept of environmental education of the Republic of Kazakhstan. Astana, 2002.

6. The concept of environmental safety of the Republic of Kazakhstan. Astana, 2002.

7. Ecological Code of the Republic of Kazakhstan, Astana 2007

8. State Program of Health Development of the Republic of Kazakhstan "Densaulyk" for 2016-2019.

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; - uses a qualitative and quantitative analysis of chemical compounds by physicochemical methods; - prepares solutions of standard substances,	-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; - understands and explains the characteristic properties of acid-base, redox, complexometric and precipitation titration methods;	-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 resources offering their own judgments and opinions; - publicly speaking with the presentation of their own judgments, analysis and

	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.	- justifies the results of educational experiments, explains the observed facts and phenomena from a scientific point of view.	synthesis of information in the field of analytical chemistry.

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:** 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.

8. 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.

9. 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)

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

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

12. 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.Zurabyan S. E. Organic chemistry . Textbook. M: GEOTAR-Media, 2014
2.Azimbayeva, G. T. Organic chemistry : a textbook / G. T. Azimbayeva. - Almaty: [s. n.], 2016. - 313 p.
3.Tulkibayeva, chemistry of functional derivatives of organic molecules [: studybook. - - Almaty: "Evero", 2015. -180 p.