The catalog of elective disciplines

1. Department: "Pharmaceutical disciplines"
2. Level of training: College
3. Educational program: "Pharmacy"
4. Course: 3rd year, 6th semester
5. Name of elective discipline: «Organizational Framework for Good Practices (GxP) »
6. Number of credits: 3 credit/72 hours
7. Purpose: The purpose of studying this discipline is to form a complex of knowledge among future specialists regarding the basic principles, categories, methods and tools of quality management in modern pharmaceutical organizations, generalized main achievements of theory and practice in the field of quality, ideas about the system organization of quality management processes in an enterprise that meets the requirements of international standards and the acquisition by future specialists of skills for successful work in market conditions.
8. Tasks:
• to form knowledge about good pharmacy practice - GPP;
• to form knowledge about good laboratory practice - GLP;
• to form knowledge about Good Distribution Practice - GDP;
• to form knowledge about good clinical practice - GCP;
to form knowledge about good manufacturing practice - GMP;

9. Content of the discipline (30-50 words):
The quality of medicines is laid down at the stage of pharmaceutical development, then confirmed in the course of preclinical and clinical studies. Further, after passing the state registration, its life cycle begins. These are proper laboratory, clinical, manufacturing, distribution, pharmacy, etc. Only strict compliance with the requirements of all these practices can ensure the quality of medicines. Since drugs directly affect patient safety, all GXPs are mandatory. The subject of study of the discipline "Organizational Foundations of Good Practices in Pharmacy (GXP)" is the relationship that is formed in the process of planning, managing, ensuring and improving quality within the organization's quality system.
10. Justification of the choice of discipline:
The "Organizational Framework for Good Practices (GxP)" plays an important role in shaping the profession of pharmacist and providing specialized training for graduates. The curriculum reflects the requirements GPP,GLP,GDP,GMP,GCP.
11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):
1) Knowledge and understanding:
- Demonstrates professional knowledge and understanding of current trends in the development of the pharmaceutical industry in accordance with the requirements of the current legislation of the Republic of Kazakhstan and Good Pharmaceutical Practices (GxP)
2) **Application of knowledge and understanding**:
- Classifies the quality indicators of pharmaceutical products, applies statistical methods of quality management in the performance of technological operations.
3) **Formation of judgments**:
- Has the skills to monitor compliance with GxP standards.
4) **Communication skills**:
- Formulates own conclusions in the form of recommendations on the quality system; argues for own choice of method and quality management tools.
5) **Learning skills or learning abilities**:
- Develops documentation of the organization's quality management system in accordance with the requirements of ISO 9000 standards when building a system and preparing an enterprise for certification; forms systemic thinking in the field of providing pharmaceutical care to the population.

12. Pre-requisites: Organization of pharmaceutical activities, organization and economics of pharmacy with the basics
management and marketing.
13. Post-requisites: Professional practice.
14. Literature:
In Kazakh:
basic:
1.
In Russian:
Basic:
1. Guideline “Drugs. Good Distribution Practice” (ST-N MOZU 42-5.0:2008).
2. Guidelines for Good Storage Practices for Pharmaceuticals (“Guidetogoodstoragepracticesforpharmaceuticals”). World Health Organization. WHO Technical Report Cycle, No. 908, 2013.
3. Shubenkova E.V. Total quality management: textbook / E.V. Shubenkov. - M.: EXAM, 2015. - 256 p.
4. Salimova, T.A. History of quality management: textbook / T.A. Salimova, N.Sh. Vatolkin. - M. : KNORUS, 2015. - 256 p.
5. Abutidze Z.S. Quality management and organization reengineering: study guide / Z.S. Abutidze, L.N. Alexandrovskaya, V.N. Bas and others - M.: Logos, 2013. - 328 p.
Additional:
6. Arystanov, Zh. M. History of pharmacy: textbook / Zh. M. - Almaty: Evero, 2016. - 184 p.
7. Arystanov, Zh. M. Organization of pharmaceutical activities: textbook. allowance . - Almaty: Evero, 2015. - 608 p.
Management and economics of pharmacy: textbook / ed. I.A. Narkevich. – M.: GEOTAR-Media, 2017. – 928 p..
1. Department: "Pharmaceutical disciplines"
2.Level of training: College
3. Educational program: "Pharmacy"
4.Course: 3rd year, 6th semester
5. Name of elective discipline: " Special technology""
6. Number of credits (at least 5 credits): 1 credit/24 hours
7. Purpose: Formation of students theoretical knowledge and practical skills in the production of ready-made dosage forms and homeopathic medicines, quality control, taking into account technological features, methods of biopharmaceutical evaluation.
8. Tasks:

- Teach the theoretical basics of preparation of dosage forms and homeopathic medicines and professional skills and abilities;
- Teach to develop and implement special technologies in the production of dosage forms, the choice of excipients;
- Teach to choose the ways of administration of dosage forms depending on the age factor;
- To familiarize with the features of the technology of cosmetic, veterinary and homeopathic medicines, biologically active additives, parapharmaceutical and nutraceutical products.

9. Content of the discipline (30-50 words):
The curriculum includes homeopathic dosage forms (essences, tinctures, triturations, granules, solutions, opodeldoks, etc.), cosmetics (hygienic, therapeutic and prophylactic, decorative, etc.), age and veterinary dosage forms, Biological active additives, the basic principles of the relevant practical standards rules are included.
10. Justification of the choice of discipline:
"Special technology" plays an important role in shaping the profession of a pharmacist and ensuring the readiness of graduates. It is aimed at the development and implementation of

innovative technologies in the production of dosage forms, the study of ways to introduce dosage forms depending on the age factor, familiarization with the technology of homeopathic medicines.

11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):

1) Knowledge and understanding:

- Demonstrates the achievements of pharmaceutical science and practice, knowledge of the concept of development of modern pharmacy and medicine;

-Knowledge of the main provisions of regulatory documents regulating the manufacture, quality assessment, storage and use of medicines.

2) Application of knowledge and understanding:

-Manufactures dosage forms in pharmaceutical production, performs calculations in the production of finished medicines, homeopathic medicines, substances, semi-finished products and other pharmaceutical products;

-Manufactures dosage forms in accordance with regulatory documents (technological regulations, industry standards, state standards and others).

3) Formation of judgments:

- Analyzes the search and introduction of new excipients for pharmaceutical production.

4) Communication skills:

-Demonstrates skills and abilities in planning and conducting the production process.

5) Learning skills or learning abilities:

- Demonstrates the ability to work with reference and scientific pharmaceutical literature, electronic databases and computer training programs in the field of professional activity.

12.Pre-requisites: Technology of dosage forms.

13.Post-requisites: Professional activity.

14. Literature:

In Kazakh:

basic:

1. Sagyndykova B. A., Anarbayeva R. M. Experimental technology of medicinal species: textbook . - Karaganda: Medet Group, 2021. - 427 pages.

2. Sagyndykova B. A., Anarbayeva R. M. Pharmacy technology of medicines: textbook . - Karaganda: Medet Group, 2021. - 556 pages.

3. Sagyndykova B. A., Anarbayeva R. M. Biopharmacy and biopharmaceutical research of Medicinal Products: a textbook / Karaganda, 2021. - 172 P.

In Russian:

basic:

1. Tikhonova S.A., Zheterova S.K., Zatybekova A.K. Methodological recommendations for practical classes on the technology of homeopathic medicines: methodological recommendations.for pharm students. Universities and faculty - Almaty: Evero, 2016. – 140 p.

Electronic resource:

1. Biopharmacy and biopharmaceutical research of medicinal products: textbook / B. A. Sagyndykova, R. M. Anarbayeva. - Electron. text from. (2,211 KB). - Karaganda: Medet Group, 2021. - 172 P. el. opt. disc (CD-ROM)

2. Pharmacy technology of drugs : textbook / B. A. Sagyndykova, R. M. Anarbayeva. - Electron. text from.(6,01 MB). - Shymkent: SKMA, 2018. - 512 pages. El. opt. disc (CD-ROM).

3. Pharmacy technology of medicines [electronic resource] : textbook / B. A. Sagyndykova, R. M. Anarbayeva. - Electron. text from.(6,01 MB). - Shymkent: SKMA, 2018. - 512 pages. El. opt. disc (CD-ROM).

1. Department: "Pharmaceutical disciplines"

2.Level of training: College

3. Educational program: "Pharmacy"

4.Course: 3rd year, 5th semester

5. Name of elective discipline: "Innovative pharmaceutical technology"

6. Number of credits (at least 5 credits): 6 credit/144 hours

7. Purpose: To familiarize students with innovative technologies and modern equipment for the manufacture of solid, soft, liquid and gaseous dosage forms in pharmaceutical production and nanotechnology.

8. Tasks:

• to form knowledge on mastering the basic principles of the organization of pharmaceutical production;

• teach the theoretical foundations and professional skills and skills of manufacturing dosage forms;

• teach methods of step-by-step control and standardization of industrial medicines;

• to form knowledge about good manufacturing practices – GMP;

• teach ways to improve the technology of production of medicines;

• provide knowledge on the development and implementation of innovative technologies in the field of production of medicines;

• master the skills of research and introduction of new excipients for pharmaceutical production.

9. Content of the discipline (30-50 words):

Development of pharmaceutical production. Industrial regulations. Medical solutions. Syrups flavoring,medicinal. Fragrant waters. Powders. Fees. Pills. Auxiliary substances for the production of tablets. Tablet machines. Coating of tablets with shells. Microspheres. Pelletizing. Pellet technology.Soft, hard gelatin capsules. Industrial production of creams. Aerosols. Sprays. Methods of administration of medicinal substances in the form of inhalations. Nanotechnology.

10. Justification of the choice of discipline:

"Innovative Pharmaceutical Technology" plays an important role in shaping the profession of a pharmacist and providing special training for graduates. The curriculum reflects the basic concepts of future pharmaceutical science and practice, shows the need to bring theoretical knowledge and skills closer to modern practical pharmacy. Attention is drawn to the instructions and orders that introduce GMP requirements into production and normalize the technology and quality of production products.

11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):

1) Knowledge and understanding:

- Demonstrates knowledge of the basic principles of the organization of enterprises and small-scale pharmaceutical industries, GMP requirements, knowledge of achievements in the development of new drugs, knowledge of the device and the principle of operation of the main technological equipment, the rules of its operation.

2) Application of knowledge and understanding:

-Manufactures dosage forms in pharmaceutical production, performs calculations in the production of finished medicines, substances, semi-finished products and other pharmaceutical products;

-Manufactures dosage forms in accordance with regulatory documents (technological regulations, industry standards, state standards and others).

3) Formation of judgments:

- Analyzes the search and introduction of new excipients for pharmaceutical production.

4) Communication skills:

-Demonstrates skills and abilities in planning and conducting the production process.

5) Learning skills or learning abilities:

- Demonstrates the ability to work with reference and scientific pharmaceutical literature, electronic databases and computer training programs in the field of professional activity.

12.Pre-requisites: Technology of dosage forms.

13.Post-requisites: Special technology.

14. Literature:

In Kazakh:

basic:

1. Sagyndykova B. A. Production Technology of drugs. - Almaty, 2011. - 346 p.

In Russian:

basic:

1. Menshutina N.V., Mishina Yu.V., Alves S.V. Innovative technologies and equipment of pharmaceutical production. - Vol.1. – Moscow: BINOM Publishing House, 2016. - 328 p., ill. https://www.fkbook.ru/prod_show.php?object_uid=2176442

2. Menshutina N.V., Mishina Yu.V., Alves S.V., Gordienko M.G., Guseva E.V., Troyankin A.Yu. Innovative technologies and equipment of pharmaceutical production.-Vol.2. – Moscow: BINOM Publishing House, 2013.- 480 p., ill.

3. Pharmaceutical technology: a guide to laboratory studies. / Bykov V.A., Demina N.B., Skatkov S.A., Anurova M.N. / - M .: GEOTAR - Media, 2009.- 304 p.

Internet resource:

1. Gladukh E.V., Chueshov V.I. Technology of medicines of industrial production. Volume 1. – 2014. – 696p. https://www.twirpx.com/file/2721399/

2. Technology of medicines of industrial production: textbook: in 2 hours / O.A. Lyapunova, E.A.Ruban, E.V.Gladukh (et al.): National Pharmaceutical University. – Vinnytsia: Nova Kniga, 2014. – Part 2. – 662p.

Catalog of elective disciplines for the 2024 – 2025 academic year

1. Department: "Pharmaceutical disciplines"

2.Level of training: College

3. Educational program: "Pharmacy"

4.Course: 1 rd year, 1 th semester

5. Name of elective discipline: " Introduction to the specialty "

6. Number of credits (at least 5 credits): 5 credit/120 hours

7. Purpose: To acquaint students with ideas about the importance of the profession of a future pharmacist, his role in modern society.

8. Tasks:

- To familiarize students with the main directions of future professional activity in the field of drug provision of the population;
- To prepare students for the successful development of disciplines studied in the specialty pharmacy, and the definition of an individual trajectory in the educational process;
- To give an opportunity to understand the essence and value of their future activities in the chosen profession.

9. Content of the discipline (30-50 words): The discipline "Introduction to the specialty" introduces the role of basic and professional disciplines in the training of a qualified specialist, services in the field of drug turnover, pharmaceutical services in pharmacy organizations, pharmaceutical production, institutions of pharmaceutical supervision and management, chemical and toxicological departments of the Center of forensic medicine, in the field of education and science, institutions of standardization and certification of medicines.

10. Justification of the choice of discipline: To acquire the necessary professional knowledge and skills, students need to choose their educational trajectory. A special place in the preparation of an individual educational trajectory is occupied by the discipline "Introduction to the specialty".

11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):

1) Knowledge and understanding:

- Demonstrates knowledge of the basic basic, professional disciplines and their role in the formation of a specialist, knowledge of the main types of professional activity.

2) Application of knowledge and understanding:

- Demonstrates the interrelation of the studied disciplines in the preparation of pharmacists.

3) Formation of judgments:

- Formulates arguments for promoting a healthy lifestyle, taking measures to prevent diseases;

4) Communication skills:

- Able to make individual judgments about the preparation of dosage forms, to make out in the form of abstracts, presentations, to present in practical classes, in student scientific circles, conferences;

5) Learning skills or learning abilities:

- Демонстрирует умение пользоваться справочной и научной фармацевтической литературой, электронными базами и пользоваться программами компьютерного обучения в области профессиональной деятельности.

12.Pre-requisites:

13.Post-requisites: " Pharmaceutical hygiene.

14. Literature:

In Kazakh:

basic:

1. Sagyndykova, B. A., R. M. Anarbayeva. Darilerdin darikhanalyk technologiyasy: okulyk . - Kagandy : Medet Group, 2021. - 556 bet.
2. Sagyndykova B.A. Darilerdin ondiristik technologiyasy. -Almaty, 2011. - 346 b.

In Russian:

basic:

1. Menshutina N.V., Mishina Yu.V., Alves S.V. Innovative technologies and equipment of pharmaceutical production. - Vol.1. – Moscow: BINOM Publishing House, 2016. - 328 p., ill. https://www.fkbook.ru/prod_show.php?object_uid=2176442
2. Menshutina N.V., Mishina Yu.V., Alves S.V., Gordienko M.G., Guseva E.V., Troyankin A.Yu. Innovative technologies and equipment of pharmaceutical production.-Vol.2. – Moscow: BINOM Publishing House, 2013.- 480 p., ill.
3. Arystanov Zh.M. Introduction to the specialty "Pharmacy": textbook.manual / Zh.M. Arystanov – reviewed and recommended for release at the meeting. Learned.- Almaty: Evero, 2015. --132 p.- 50 copies.
4. The Code of the Republic of Kazakhstan "On the health of the people and the healthcare system" dated July 7, 2020 No. 360-VI SAM.

1. Department: "Pharmaceutical disciplines"

2.Level of training: College

3. Educational program: "Pharmacy"

4.Course: 1 rd year, 2th semester

5. Name of elective discipline: " Pharmaceutical hygiene"

6. Number of credits (at least 5 credits): 5 credit/120 hours

7. Purpose: To familiarize students with the skills of hygienic organization of safe working conditions for workers working in pharmaceutical production and pharmacies.

8. Tasks:

- To teach the basics of hygiene of pharmacy institutions and pharmaceutical production;
- Teach to evaluate the organization of sanitary and hygienic measures in pharmaceutical production;
- Train to work with regulatory, basic, reference and scientific documents on occupational health;
- To teach effective methods of combating environmental pollution and industrial damage.

9. Content of the discipline (30-50 words): "Pharmaceutical Hygiene" is aimed at the formation of a qualified specialist with the development of a set of professional competencies of students. In case of violation of the sanitary and hygienic regime of the technological process in pharmacies and pharmaceutical production, non-compliance with occupational hygiene, personal hygiene, medicines can have an adverse and sometimes toxic effect on the body of workers. These conditions make it necessary to teach the basics of occupational hygiene at the Faculty of Pharmacy.

10. Justification of the choice of discipline: "Pharmaceutical hygiene" plays an important role in shaping the profession of a pharmacist. In pharmacies and pharmaceutical production, attention is paid to measures to improve working conditions, optimize the labor process and protect the environment.

11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):

1) Knowledge and understanding:

- Demonstrates knowledge of the basic physical, chemical and biological factors of the production environment, methods of hygienic assessment of working conditions of pharmaceutical industry workers, effective methods of combating environmental pollution and industrial hazards;

2) Application of knowledge and understanding:

- Knows the relevant sanitary and epidemiological requirements and organization in pharmacies and pharmaceutical production.

3) Formation of judgments:

- Knows sanitary and hygienic requirements and experience of sanitary supervision over the design and reconstruction of a pharmaceutical enterprise.

4) Communication skills:

- Organizes the labor protection of employees of pharmaceutical enterprises and pharmacies.

5) Learning skills or learning abilities:

- Demonstrates the ability to use reference and scientific pharmaceutical literature, electronic databases and use computer training programs in the field of professional activity.

12.Pre-requisites: Organic chemistry.

13.Post-requisites: Technology of dosage forms.

14. Literature:

In Kazakh:

basic:

1. Tokanova sh. e., Zhandauletova M. B., general hygiene. - Almaty: "Evero", 2013-216 P.
2. Bolshakov a.m. general hygiene-Moscow: "GOETAR media", 2014-399 P.In Russian:

basic:

1. Burak, I. I. Pharmaceutical hygiene: a manual for students of higher educational institutions. education, students in the specialty 1-79 01 08 "Pharmacy" / I. I. Burak, A. B. Yurkevich, N. I. Miklisa; Ministry of Health of the Republic of Belarus, UO "Vitebsk State University named after Order of Friendship of Peoples. un-ta". - Vitebsk : VSMU, 2018. - 263 p.
2. Kenesariev Yu.I., Balmakhaeva R.M., Zhakashov N.J. Bekmagambetova J.D. Zholamanov M.E., Togyzbayeva K.K., Hygiene.Almaty: Samara-Print, 2009-686 P.

1. Department: "Pharmaceutical disciplines"

2. Level of training: college

3. Educational program: "Pharmacy"

4.Course: 1/2

5. Name of the elective discipline: "Organization of pharmaceutical activity"

6. Number of credits : 144/6

7. Purpose: Formation of knowledge, skills and abilities in the field of organization and functioning of the pharmaceutical industry and subjects of medicines circulation in order to provide high-quality pharmaceutical care to the population and medical and preventive organizations.

8. Tasks:

- give an idea of the organizational structure, principles of work organization, legal regulation and the main aspects of the healthcare and pharmacy system.

- □ formation of knowledge on the organization of prescription and over-the-counter dispensing of medicines;
- □ tell people and organizations about the organization and implementation of the wholesale and retail sale of medicines, including the purchase, distribution, sale and storage;
- □ to acquaint medical workers with the principles of providing pharmaceutical services, as well as to teach the most effective, high-quality and safe medicines, pharmacy products, how to purchase, store and use them in matters of public choice;
- teaching the basic principles of pharmaceutical ethics and deontology.

9. The content of the discipline (30-50 words):

The organization of pharmaceutical activity is a discipline that forms the professional knowledge, skills and abilities of a specialist working in the pharmaceutical market. The subject of study of the discipline "Organization of Pharmaceutical Activities" are the subjects of circulation of medicines engaged in pharmaceutical activities, economic relations between them and the external environment, as well as objects, phenomena and processes that form the basis of their activities in the pharmaceutical market.

10. Rationale for the choice of discipline:

"Organization of Pharmaceutical Activities" plays an important role in shaping the profession of a pharmacist and providing special training for graduates. The curriculum reflects the basic principles of organizing pharmaceutical care for the population, legal regulation of the sphere of circulation of medicines and medical devices of the Republic of Kazakhstan, pharmacy organizations: classification and functions, Organization of storage of medicines and pharmacy products, Pharmacy Stock Department.

11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):

1) **Knowledge and understanding**:

- Demonstrates professional knowledge and understanding of current trends in the development of the pharmaceutical industry in accordance with the requirements of the current legislation of the Republic of Kazakhstan and Good Pharmaceutical Practices (GxP)

2) **Application of knowledge and understanding**:

- Classifies the quality indicators of pharmaceutical products, applies statistical methods of quality management in the performance of technological operations.

3) **Formation of judgments**:

- Has the skills to monitor compliance with GxP standards.

4) **Communication skills**:

- Formulates own conclusions in the form of recommendations on the quality system; argues for own choice of method and quality management tools.

5) **Learning skills or learning abilities**:

- Develops documentation of the organization's quality management system in accordance with the requirements of ISO 9000 standards when building a system and preparing an enterprise for certification; forms systemic thinking in the field of providing pharmaceutical care to the population.

1) **Knowledge and understanding**:

- Demonstrates professional knowledge and understanding of current trends in the development of the pharmaceutical industry in accordance with the requirements of the current legislation of the Republic of Kazakhstan and Good Pharmaceutical Practices (GxP)

2) **Application of knowledge and understanding**:

- Classifies the quality indicators of pharmaceutical products, applies statistical methods of quality management in the performance of technological operations.

3) **Formation of judgments**:
- Has the skills to monitor compliance with GxP standards.
4) **Communication skills**:
- Formulates own conclusions in the form of recommendations on the quality system; argues for own choice of method and quality management tools.
5) **Learning skills or learning abilities**:
- Develops documentation of the organization's quality management system in accordance with the requirements of ISO 9000 standards when building a system and preparing an enterprise for certification; forms systemic thinking in the field of providing pharmaceutical care to the population.
12. Pre-requisites: History of Pharmacy
13. Post-requisites: Fundamentals of psychology and communication skills in pharmacy
14. Literature:

In Russian:
basic:
1. Collection of Legislative and regulatory legal acts regulating pharmaceutical activities in the Republic of Kazakhstan: collection / comp. B.K. Makhatov [i dr.]. - Shymkent: Zhasulan, 2017. - 380 p.
2. Arystanov, Zh. M. Organization of pharmaceutical activities: textbook. allowance . - Almaty: Evero, 2015. - 608 p.
In Kazakh:
basic:
1. Arystanov Zh.M. Pharmaceutical kyzme.

1. Department: "Pharmaceutical disciplines"
2.Level of training: College
3. Educational program: "Pharmacy"
4. Course: 3rd year, 5th semester
5. Name of elective discipline: « Pharmaceutical Logistics with Business Basics »
6. Number of credits : 6 credit/144 hours
7. Purpose: Formation of students' systemic knowledge of the conceptual foundations of pharmaceutical logistics, training in methods of managing material and other flows on the organization of pharmaceutical activities in the field of circulation of drugs of the Republic of Kazakhstan.
8. Tasks:
• to form knowledge about the concepts of macro, micrologistics;
• to form knowledge about the current legal documents used in warehouse logistics;
• learn to predict the main trends in the development of wholesale trade in the pharmaceutical market;
• to form knowledge about the relationship between logistics and marketing, the levels of pharmaceutical distribution channels. 7R principle in logistics.;
• The essence of entrepreneurship in the Republic of Kazakhstan. Directions and types of pharmaceutical business, structure, problems.
Manage, control and regulate business activities. Development and improvement of the drug registration and certification system.
9. Content of the discipline:

Factors and levels of development of pharmaceutical logistics. Information logistics systems in pharmacy. Goals and role of information flows in pharmaceutical logistics systems. Tasks and functions of procurement logistics. The mechanism of functioning of procurement logistics in pharmacy. Procurement planning. Supplier selection. Distribution channels for pharmaceutical and medical products. Logistics as a factor in increasing the competitiveness of firms. Types of reserves. The place of inventory logistics in the logistics system of pharmaceutical organizations. Organizational and legal foundations of entrepreneurship in the Republic of Kazakhstan. Legal forms of entrepreneurial activity in the Republic of Kazakhstan. Characteristics and structure of pharmaceutical personnel. Assessment of pharmaceutical personnel.

10. Justification of the choice of discipline:

"Pharmaceutical Logistics with the Fundamentals of Entrepreneurship" plays an important role in shaping the profession of a pharmacist and providing specialized training for graduates. The curriculum reflects the basic concept of logistics, factors and levels of development, the competitiveness of pharmaceutical logistics, information logistics systems and infrastructure in pharmacy, the marketing system for pharmaceutical products.

11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):

1) Knowledge and understanding:

- Demonstrates knowledge and understanding of the subject, tasks and basic principles of pharmaceutical logistics with the basics of entrepreneurial activity; legislative and regulatory documents regulating the fundamentals of pharmaceutical consulting and pharmaceutical law in the field of drug circulation in the Republic of Kazakhstan; understands the importance of the ability to "listen and hear", i.e. demonstrates the principles of pharmaceutical ethics and deontology, customer focus.

2) Application of knowledge and understanding:

-applies knowledge to carry out wholesale and retail sales of medicines and medical devices, as well as to ensure the safety of inventory items in warehouses and vehicles; able to work in a team, in conditions of uncertainty; analyzes information based on IT - technology in the field of professional activity.

3) Formation of judgments:

- applies the acquired knowledge in the organization of prescription and over-the-counter dispensing of medicines and medical devices, their storage, taking into account physical and chemical properties, toxicological groups, expiration dates, dosage form based on facts, phenomena, theories and complex dependencies between them.

4) Communication skills:

- Forms systemic thinking in the field of pharmaceutical logistics with the basics of entrepreneurial activity; systematizes the results of scientific research in the field of pharmaceutical logistics with the basics of entrepreneurial activity.

5) Learning skills or learning abilities:

- Informs pharmacists of the rules: wholesale and retail sales of medicines and medical devices, as well as ensuring the safety of inventory items in warehouses and vehicles; informs medical workers and pharmacists about new legislative and regulatory acts regulating the sphere of drug circulation in the Republic of Kazakhstan, as well as additions and changes to them; demonstrates multiculturalism and openness with a conscious approach to work.

12. Pre-requisites: Organization of pharmaceutical activities, organization and economics of pharmacy with the basics

management and marketing.

13. Post-requisites: Professional practice.

14. Literature:

In Russian:

basic:

1. Murphy, P. R. Zamanaui logistics: okulyk / P. R. Murphy, A. M. Knemeyer; agylshyn tel. room I. Baymuratova, Қ. M. Torekhanova. - 11-bass. - Almaty: Dauir, 2017. - 176 b. With.

2. Daris kesheni "Pharmaceutical Logistics" pəni boyinsha [Matin]: daris kesheni = Lecture complex in the discipline - "Pharmaceutical logistics": lecture complex / Pharmacy isin uyymdastyru zhane baskaru departments. - Shymkent: OKMFA, 2015. - 82 bet.
3. Kasipkerlikti uyimdastyru: oқu құraly / K. N. Orazbaeva [zh. b.]. - ; ҚR BҒM Atyrau munai zhane gas in-nyn ғyl. kenesi usyngan. - Almaty: Evero, 2010. - 204 bet. With.
4. Kasipkerlik қyzmet negizderi : okulyk / K. D. Shertaeva, O. V. Blinova, Zh. K. Shimirova. - Shymkent: OҚMA, 2019. - 151 ben
5. Fundamentals of entrepreneurial activity: textbook / K. D. Shertaeva, O. V. Blinova, Zh. K. Shimirova. - Shymkent: YuKMA, 2019. - 152 p.
Additional:
1. Murphy, P. R. Zamanaui logistics: okulyk / P. R. Murphy, A. M. Knemeyer; agylshyn tel. room I. Baymuratova, Қ. M. Torekhanova. - 11-bass. - Almaty: Dauir, 2017. - 176 b. With
Kasipkerlikti ұyymdastyru: oқu құraly / K. N. Orazbaeva [zh. b.]. - ; ҚR BҒM Atyrau munai zhane gas in-nyn ғyl. kenesi usyngan. - Almaty: Evero, 2010. - 204 bet. c

Catalog of elective disciplines for the 2024 – 2025 academic year

1. Department: "Pharmaceutical disciplines"
2.Level of training: College
3. Educational program: "Pharmacy"
4.Course: 3rd year, 5th semester
5. Name of elective discipline: "Pharmaceutical analysis methods and equipment "
6. Number of credits (at least 5 credits): 5 credit/120 hours
7. Purpose: Training in the use of critical instrumental analysis methods and work in modern pharmaceutical enterprises that ensure the quality and safety of medicines.
8. Tasks:
• Formation of pharmaceutical analysis of biologically active compounds on modern equipment;
• Teach the basic principles of drug standardization;
• Principles and conditions of work on the equipment (instruments), preparation of samples for analysis, interpretation of the results of instrumental analysis;
• To teach methods of research and analysis of biologically active compounds according to their physical and chemical properties;
• Training in the use of general pharmacopoeial methods in the analysis of medicinal products;
• Train in the technique of performing qualitative analysis on analytical equipment for the extraction of chemicals.
9. Content of the discipline (30-50 words):
Methods of pharmacopoeial tests for individual quality indicators. Photometry method in the ultraviolet and visible region of the spectrum. Method of photoelectrocolorimetry in the analysis of drugs. Chromatographic methods for the analysis of drugs. Refractometry. Analysis of drugs by thin layer chromatography. Polarimetry. Pharmacopoeial methods for testing drugs for the indicators "dissolution", "disintegration" and "abrasion". Analysis of drugs by high performance liquid chromatography.
10. Justification of the choice of discipline:
"Methods and Equipment of Pharmaceutical Analysis" play an important role in shaping the profession of a pharmacist and providing specialized training for graduates. Based on the physical and chemical properties of the studied compounds, the curriculum specifies the selection of modern equipment and instruments, finding new ones when solving problems in the field of professional activity.
11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):
1) Knowledge and understanding:
- Demonstrates knowledge of the basic principles of drug standardization, GMP, GLP requirements, achievements in the development of new drugs, principles of construction and operation of the main technological equipment.

2) Application of knowledge and understanding:
- Selection of methods of analysis, determination of the chemical composition and equipment at the stages of production, acquisition, storage and use of medicines;
- prepares medicines in accordance with the Tax Code (technological regulations, OST, GOST, etc.).

3) Formation of judgments:
- Analyze new knowledge, skills of searching and analyzing information necessary for professional activities in the field of pharmaceutical production.

4) Communication skills:
- Demonstrates knowledge and skills in planning and managing a pharmaceutical manufacturing process.

5) Learning skills or learning abilities:
- Demonstrates the ability to work with reference and scientific pharmaceutical literature, electronic databases and computer training programs in the field of professional activity.

12.Pre-requisites: pharmaceutical chemistry
13.Post-requisites: Professional activity.
14. Literature:

In Kazakh:
basic:

1. Arystanova T.A. Pharmaceutical chemistry: okulyk.t.1-Almaty: "Evero", 2015.-592b.
2. Arystanova T.A. Pharmaceutical chemistry: okulyk.t.2-Almaty: "Evero", 2015.-602b.
3. RK State Pharmacopoeia.-Almaty: "Zhibek Zholy", 2008.-1 T.-592p.
4.RK State Pharmacopoeia - Almaty: "Zhibek Zholy", 2008.-2 T.-804p.
5.RK State Pharmacopoeia.-Almaty: "Zhibek Zholy", 2008.-3 T.-709p.

In Russian:
basic:

1. Quality control and standardization of medicines (Electronic resource): manual / ed. Ramenskoy G. V., Ordabayeva S. K.-M: I MSMU.
2. Kharitonov Yu. Ya. Analytical chemistry. Analytics - 1. General theoretical foundations. Qualitative analysis (Electronic resource): textbook / Yu. Ya. Kharitonov. – Electron. text data. (44.3 Mb). –M.: GEOTAR –Media, 2017.-
3. Kharitonov, Yu. Ya. Analytical chemistry. Analytics - 2. Quantitative analysis. Physico-chemical (instrumental) methods of analysis (Electronic resource): textbook / Yu. Ya. Kharitonov. – Electron. text data. (43.1 Mb). –M.: GEOTAR – Media, 2017.-
4.Pharmaceutical chemistry (Electronic resource): textbook / ed. G.V. Ramenskoy. - Moscow. Binomial. Knowledge Lab, 2015. -467p.

1. Department of "Pharmaceutical disciplines"
2. Level of education: college
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4. Course, academic semester: 1/2
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6. Number of credits (not less than 5 credits): volume of study hours/credits/: 144(6)
7. Purpose: To acquaint students with the history of the development of pharmacognosy, the organization of the procurement of medicinal plant materials, the chemical composition and

classification of medicinal plants, the basics of natural effective use, the processes for preparing medicinal herbs

8.Responsibilities:

- the main tasks of teaching the discipline are the formation of the following knowledge and skills in students:

- study of the chemical composition and properties of medicinal plants in accordance with the ever-growing demand for high-quality phytoproducts and medicinal plant materials;

- research work aimed at the properties and chemical composition of mineral substances of animal origin, widely used in the arsenal of modern pharmacotherapeutic drugs;

- carrying out phytochemical and commodity analysis of raw materials of natural origin.

9. The content of the discipline (30-50 words):

To study the chemical composition and properties of medicinal plants in accordance with the ever-growing demand for high-quality phytoproducts and medicinal plant raw materials;

research work aimed at the properties and chemical composition of mineral substances of animal origin, widely used in the arsenal of modern pharmacotherapeutic drugs;

carrying out phytochemical and commodity analysis of raw materials of natural origin.

10. Fundamentals of the choice of discipline: The value of the discipline Phytopharmacology and its tasks. Fundamentals of the process of preparation of medicinal plant materials. Medicinal plant raw materials. Preparation of medicinal plant raw materials: rules for collection, storage, primary processing, bringing to a standard state, storage, packaging, transportation.

11. Learning outcomes (4-6 learning outcomes according to the Dublin Descriptors):

1) Knowledge and understanding (the ability to demonstrate knowledge and understanding of the same industry, including elements of leading education in the field of study). Demonstration of the purpose of the subject and the basics of pharmacognosy;

2) Be able to apply knowledge and understanding (the ability to apply this knowledge and understanding at a professional level);

3) Sequencing (sequencing and problem solving in the field of study). Efficient preparation, drying of medicinal plant materials. Substantiates the botanical and pharmacognostic characteristics of the plant for diagnosis and formulates his opinion on the conservation and determination of its reserves in the form of a recommendation. Formulates a modern nomenclature of medicinal raw materials of plant and animal origin;

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5) Teaching skills or learning ability (collecting and interpreting information necessary to make judgments from social, ethical and scientific points of view). Offers individual opinions on the efficient preparation, drying and storage of medicinal plant materials and macroscopic and mycoscopic analysis of the DPC. explains the relationship;

12. Prerequisites: botany, Latin

13. Postrequisites: pharmacognosy, pharmacology

14. Literature (last 10 years):

Literature:

Main:

1. Рахимов, Қ. Д. Фитохимия, фитофармакология, фитотерапия [Мәтін] : оқу құралы / Қ. Д. Рахимов, С. М. Әдекенов ; ҚР Ұлттық ғыл. акад.; "Фитохимия" халықаралық ғыл.-өндірістік холдингі.; Фармакология ин-ты. - Алматы ; Караганда : ЖШС "Жания-Полиграф", 2015. - 538 бет с
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дәрігерлер білімін жетіл. ин-ты ғыл. кеңесі бас. ұсынған. - Алматы : ЖШС "Жания-Полиграф",2015.- 528с.
3. Байзолданов, Т. Косметикалық препараттар және оларды дайындауда қолданылатын белсенді және көмекші заттар [Мәтін] : оқу құралы / Т. Байзолданов. - Алматы : Эверо, 2016. - 212 б.
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from English:
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4. «Параграф» ақпараттық жүйе «Медицина» бөлімі https://online.zakon.kz/Medicine
5. «Заң» құқықтық ақпараттың электронды дереккөзі https://zan.kz
6. Ғылыми электрондық кітапхана https://elibrary.ru/
7. «BooksMed» электронды кітапханасы http://www.booksmed.com
8. «Web of science» (Thomson Reuters) http://apps.webofknowledge.com
9. «Science Direct» (Elsevier) https://www.sciencedirect.com
10. «Scopus» (Elsevier) www.scopus.com
11. PubMed https://www.ncbi.nlm.nih.gov/pubmed

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2. Rakhimov, K.D. Phytopharmacology. Pharmacology - Thesaurus. [Matin]: oқu құraly = Phytopharmacology. Pharmacology - Thesaurus: textbook. allowance / Қ. D. Rakhimov; ҚR ulttyk gylym acad. Pharmacology in-you; ҚR densaulyқ saktau zhane әleumettik lady Ministerligi; Kazakh honey. үzdiksiz bilim i take un-ti AҚ. - 2 bass tolykt., ond. Zhane tuzet. ; Almaty meml. darigerler bilimin zhetil. in-ty gyl. kenesi bass. Usyngan. - Almaty: ZHSS "Zhaniya-Polygraph", 2015.- 528s.
3. Baizoldanov, T. Cosmetic preparation zhane olardy dayyndauda koldanylatyn belsendi zhane kömekshi zattar [Matin]: oқu құraly / T. Baizoldanov. - Almaty: Evero, 2016. - 212 b.
4. Baizoldanov, T. Cosmetic preparation zhane olardy dayyndauda koldanylatyn belsendi zhane komekshi zattar [Matin]: oқu құraly / T. Baizoldanov; ҚR densaulyқ saktau Minister of League S. Zh. Asfendiyarov atyndaғy KazMU. - Almaty: Evero, 2012. - 212 bet.

Resourcetar electrodes
Kitapan electrodes
12. http://lib.ukma.kz
13. Республикалық жоғары оқу орындары аралық электронды кітапхана http://rmebrk.kz/
14. «Студент кеңесшісі» Медициналық ЖОО электронды ітапханасыhttp://www.studmedlib.ru
15. «Параграф» ақпараттық жүйе «Медицина» бөлімі https://online.zakon.kz/Medicine
16. «Заң» құқықтық ақпараттың электронды дереккөзі https://zan.kz
17. Ғылыми электрондық кітапхана https://elibrary.ru/
18. «BooksMed» электронды кітапханасы http://www.booksmed.com
19. «Web of science» (Thomson Reuters) http://apps.webofknowledge.com
20. «Science Direct» (Elsevier) https://www.sciencedirect.com
21. «Scopus» (Elsevier) www.scopus.com
22. PubMed https://www.ncbi.nlm.nih.gov/pubmed

1. Department: "Pharmaceutical disciplines"
2. Level of training: College
3. Educational program: "Pharmacy"
4. Course: 3rd year, 6th semester
5. Name of elective discipline: «Artificial Intelligence (AI)»
6. Number of credits: 5 credit/120 hours
7. Purpose: To provide students with systematic knowledge of the fundamental concepts of AI, its application methods, and the principles of designing intelligent systems.
8. Tasks:
- To study core AI algorithms and models (neural networks, machine learning).
- To master logical methods for knowledge representation and problem-solving.
- To develop skills in processing complex data and creating expert systems.

9. Content of the discipline (30-50 words):
History of AI, knowledge representation models, Machine Learning algorithms, neural network architectures, basics of Natural Language Processing (NLP) and Computer Vision.
10. Justification of the choice of discipline:
High demand for AI specialists in the global labor market and its integration into sectors like medicine, industry, and finance.
11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):
1) Knowledge and understanding:
- Ability to describe theoretical foundations, algorithms, and technological trends in AI.
2) **Application of knowledge and understanding**:
- Ability to build and fine-tune machine learning models to solve practical problems.

3) **Formation of judgments**:
- Ability to analyze the effectiveness and ethical aspects of intelligent systems.
4) **Communication skills**:
- Ability to prepare technical documentation and explain AI solutions to specialists.
5) **Learning skills or learning abilities**:
- Capacity to independently master new libraries and tools in the field of AI.
12. Pre-requisites: Calculus, Probability Theory, Algorithms and Programming (Python), Databases.
13. Post-requisites: Deep Learning, Data Science, Robotics, Pattern Recognition Systems.
14. Literature:
Basic: Russell S., Norvig P. "Artificial Intelligence: A Modern Approach"; specialized textbooks on Machine Learning with Python (Scikit-Learn, TensorFlow).

1. Department: of chemical disciplines, Biology and Biochemistry
2. Level of preparation: baccalaureate
3. Specialty: 6B10106 – Pharmacy boosters
4. Course: 1
5. Name of elective discipline: "Physical and colloid chemistry"
6. Amount of credits: 4
7. Purpose: To form knowledge of the general theoretical foundations of physical and colloid chemistry and train in the application of the knowledge and skills acquired during the analysis of medicinal substances at all stages of their manufacture and quality control of medicinal forms.
8. Tasks: - to form students' understanding of the patterns of the course of physicochemical processes.
- To give knowledge of the basic concepts and laws of thermodynamics.
- to form an idea about the properties of diluted solutions.
- to give an idea of the thermodynamics of electrolyte solutions, methods for measuring the pH of solutions, the properties of buffer solutions.
- to form an idea about the basic concepts and methods of electrochemistry.
- to give an idea of the kinetics of chemical reactions and catalysis.
- to form an understanding of dispersed systems and surface phenomena.
- to acquaint with physical and chemical methods of measurements.
9. Justification of the choice of discipline:
Physical and colloidal chemistry is one of the main disciplines in the field of pharmaceutical education, which has a significant role in the preparation of highly qualified specialists - pharmacists. This item forms chemical thinking, determines the patterns of physical and chemical processes and the conditions for achieving chemical equilibrium, teaches to analyze and draw conclusions about the influence of external factors, the nature of substances on the course of chemical reactions.

10. Justification of the choice of discipline: The formation of theoretical knowledge and practical skills of physical and chemical laws in the preparation of drugs is the basis of teaching physical and colloidal chemistry. Physical and colloidal chemistry is the basis of such special disciplines as pharmaceutical chemistry, technology of synthetic drugs, pharmacognosy. technology of phytopreparations, technology of medicines, etc. This implies the great importance of physical and colloidal chemistry as an important academic discipline, the development of which is given great importance in the system of pharmaceutical education.

11. Learning outcomes

Knowledge (cognitive sphere)	Skills and abilities (psychomotor sphere)	Personal and professional competencies (relationships)
- the general theoretical foundations of physical and colloid chemistry for the application of the acquired knowledge and skills at all stages of manufacturing and quality control of drugs; - general energy and kinetic patterns of chemical processes; - laws governing the physicochemical processes and the conditions for achieving chemical equilibrium;	- solves all typical tasks in physical and colloid chemistry; - owns the skills of experimental determination of the thermal effect of chemical reactions. - able to determine the osmotic pressure of solutions; -prepare buffer solutions with a given pH value. -determines the rate constants of chemical reactions. - able to determine the coefficient of surface tension of the liquid according to the method of detachment of drops; - prepares stable colloidal systems and emulsions, determines the degree of their stability; - determines the molecular weight, size and degree of swelling of the polymer.	- informs and explains the observed patterns in the field of physical and physic chemist chemistry regarding their use in pharmacy; - transmits information obtained from educational, reference, scientific literature and Internet resources; - demonstrates the ability to work in a team, conduct a discussion, discuss the results of laboratory work on physical and colloidal chemistry. - uses skills and abilities in the field of physical and colloid chemistry to perform R & D, draws up the results in the form of an abstract, presentations, reports and presents at meetings of the student circle, student scientific conferences, etc.

12. Prerequisites: inorganic chemistry.

13. Post requisites: analytical chemistry, organic chemistry, toxicological chemistry.

14. Literature

The main:

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

2. Verentsova L.G., Nechepurenko E.V. Inorganic, physical and colloid chemistry. –Almaty: Evero Publishing, 2014.

Additional:

1. Evstratova K.I., Kupina N.A., Malakhova N.E. Physical and colloidal chemistry. M .: High School. 1990
2. Krasnov K.S., Vorobev N.K., Godnev I.N. and others. Physical chemistry. In 2 books. M .: Higher School, 2001.
Additional:
1. Utelbaev B.T. Chemistry 2 vol. - Shymkent, 2000.
2. Musabekov Қ.B., bdiev Қ.ZH. Colloidty chemistry. Оқулық. - Almaty, 2011.

1. Department: "Pharmaceutical disciplines"
2.Level of training: College
3. Educational program: "Pharmacy"
4.Course: 3rd year, 5th semester

5. Name of elective discipline: "Pharmaceutical analysis methods and equipment "
6. Number of credits (at least 5 credits): 5 credit/120 hours
7. Purpose: Training in the use of critical instrumental analysis methods and work in modern pharmaceutical enterprises that ensure the quality and safety of medicines.
8. Tasks:
• Formation of pharmaceutical analysis of biologically active compounds on modern equipment;
• Teach the basic principles of drug standardization;
• Principles and conditions of work on the equipment (instruments), preparation of samples for analysis, interpretation of the results of instrumental analysis;
• To teach methods of research and analysis of biologically active compounds according to their physical and chemical properties;
• Training in the use of general pharmacopoeial methods in the analysis of medicinal products;
• Train in the technique of performing qualitative analysis on analytical equipment for the extraction of chemicals.

9. Content of the discipline (30-50 words):
Methods of pharmacopoeial tests for individual quality indicators. Photometry method in the ultraviolet and visible region of the spectrum. Method of photoelectrocolorimetry in the analysis of drugs. Chromatographic methods for the analysis of drugs. Refractometry. Analysis of drugs by thin layer chromatography. Polarimetry. Pharmacopoeial methods for testing drugs for the indicators "dissolution", "disintegration" and "abrasion". Analysis of drugs by high performance liquid chromatography.

10. Justification of the choice of discipline:
"Methods and Equipment of Pharmaceutical Analysis" play an important role in shaping the profession of a pharmacist and providing specialized training for graduates. Based on the physical and chemical properties of the studied compounds, the curriculum specifies the selection of modern equipment and instruments, finding new ones when solving problems in the field of professional activity.

11. Learning outcomes (4-6 learning outcomes according to Dublin descriptors):
1) Knowledge and understanding:
- Demonstrates knowledge of the basic principles of drug standardization, GMP, GLP requirements, achievements in the development of new drugs, principles of construction and operation of the main technological equipment.

2) Application of knowledge and understanding:
- Selection of methods of analysis, determination of the chemical composition and equipment at the stages of production, acquisition, storage and use of medicines;

- prepares medicines in accordance with the Tax Code (technological regulations, OST, GOST, etc.).

3) Formation of judgments:
- Analyze new knowledge, skills of searching and analyzing information necessary for professional activities in the field of pharmaceutical production.

4) Communication skills:
- Demonstrates knowledge and skills in planning and managing a pharmaceutical manufacturing process.

5) Learning skills or learning abilities:
- Demonstrates the ability to work with reference and scientific pharmaceutical literature, electronic databases and computer training programs in the field of professional activity.

12.Pre-requisites: pharmaceutical chemistry
13.Post-requisites: Professional activity.
14. Literature:

In Kazakh:

basic:

1. Arystanova T.A. Pharmaceutical chemistry: okulyk.t.1-Almaty: "Evero", 2015.-592b.
2. Arystanova T.A. Pharmaceutical chemistry: okulyk.t.2-Almaty: "Evero", 2015.-602b.
3. RK State Pharmacopoeia.-Almaty: "Zhibek Zholy", 2008.-1 T.-592p.
4.RK State Pharmacopoeia - Almaty: "Zhibek Zholy", 2008.-2 T.-804p.
5.RK State Pharmacopoeia.-Almaty: "Zhibek Zholy", 2008.-3 T.-709p.

In Russian:

basic:

1. Quality control and standardization of medicines (Electronic resource): manual / ed. Ramenskoy G. V., Ordabayeva S. K.-M: I MSMU.
2. Kharitonov Yu. Ya. Analytical chemistry. Analytics - 1. General theoretical foundations. Qualitative analysis (Electronic resource): textbook / Yu. Ya. Kharitonov. – Electron. text data. (44.3 Mb). –M.: GEOTAR –Media, 2017.-
3. Kharitonov, Yu. Ya. Analytical chemistry. Analytics - 2. Quantitative analysis. Physico-chemical (instrumental) methods of analysis (Electronic resource): textbook / Yu. Ya. Kharitonov. – Electron. text data. (43.1 Mb). –M.: GEOTAR – Media, 2017.-
4.Pharmaceutical chemistry (Electronic resource): textbook / ed. G.V. Ramenskoy. - Moscow. Binomial. Knowledge Lab, 2015. -467p.