**Catalog of elective disciplines**

**1. Department:** Pharmaceutical and Toxicological Chemistry
**2. Level of preparation:** undergraduate
**3. Educational program**: 6B10106 - «Pharmacy»
**4. Course:** 2
**5. The name of the elective discipline:** "Analysis of natural biological compounds"
**6. Number of credits**: 5 credits
**7. The objectives of the curriculum:** to teach the student to conduct quality control of medicines at the stages of development, reception, storage and use in accordance with the regulatory documentation of the Republic of Kazakhstan and with the quality standards GxP.
**8. Tasks of the curriculum:**

- to give students a methodology for pharmaceutical analysis of medicines at the stages of development, production, storage and use;
- to teach students to apply general pharmacopoeia research methods to drug analysis;
- to create in the students the skills and skills of conducting pharmaceutical analysis in accordance with the requirements of regulatory and technical documents to control the quality and safety of medicines.
- to consolidate the skills and skills in the field of quality control of medicines in the conditions of the existing testing laboratory;

**9. Discipline content:**

The discipline "Analysis of natural biologically active compounds" includes sections on the analysis of drugs, derivatives of terpenoids, steroid compounds, vitamins, alkaloids, antibiotics, using chemical, physico-chemical methods in accordance with the requirements of regulatory documents.

**10. Justification of the choice of discipline:**

The course “Analysis of Natural Biological Active Compounds” in the specialty 6B10106 - “Pharmacy” is aimed at developing a set of professional competencies among students, contributing to the formation of a new generation specialist in the field of drug quality control.

In recent years, the most pressing health problems throughout the world are the quality, efficacy and safety of drugs, both of synthetic origin and of natural biologically active compounds (BAS). This is due to the presence in the pharmaceutical market of a huge number of trade names of natural BAS, the penetration into the sphere of civilian trafficking of falsified drugs.

Recommended elective discipline is devoted to pharmaceutical analysis of drugs - various organic compounds from simple aliphatic to complex natural biologically active substances: alkaloids, terpenoids, vitamins, fat-soluble and water-soluble, compounds of steroid structure (hormones and hormone-like substances, cardiac glycosides), antibiotics, etc. Objects of the pharmaceutical analysis are not only individual medicinal substances (substances), but also their medicinal products (forms).

**11. Learning outcomes (competencies):**

| **Knowledge (cognitive sphere)** | **Skills and skills (psychomotor sphere)** | **Personal and professional competencies (relationships)** |
|---|---|---|
| • the subject and tasks of the pharmaceutical analysis, the procedure and principles of its organization and conduct;<br>• modern physical, chemical and physicochemical methods used in pharmaceutical analysis;<br>• common pharmacopoeial research methods used to control the quality of medicines; | • demonstrates the ability to work with the regulatory and technical documentation for monitoring the quality and safety of drugs;<br>• interprets the results of its own laboratory work and gives an opinion in accordance with the requirements of regulatory | conducts all types of pharmaceutical analysis on quality control of medicines at the stages of development, production, storage and use;<br>• uses modern physico-chemical (instrumental) methods for identification, analysis of purity and |

| | | |
|---|---|---|
| • modern nomenclature and classification of drugs;<br>• the interrelationship of the chemical structure with the pharmacological activity of the drugs underlying the production of new biologically active compounds;<br>• sources and methods of obtaining medicines that form quality requirements (content of initial, intermediate, by-product and other quality indicators);<br>• physical and chemical properties of drugs that determine the choice of methods of analysis, drug form, stability and storage conditions. | documents on the quality of medicines;<br>• demonstrates the ability to work with scientific pharmaceutical and medical literature, as well as to evaluate domestic and foreign experience on research topics. | quantitative determination of drugs. |

**12. Prerequisites:** analytical chemistry, organic chemistry, general research methods and analysis of drugs, pharmaceutical chemistry.

**13. Post requisites:** toxicological chemistry, pharmacognosy.

**14. Literature:**

**основная:**

**на русском языке:**


1. Арыстанова Т.А. Фармацевтическая химия, учебник, том I: - Алматы: «Эверо», 2015.-572 с.
2. Арыстанова Т.А. Фармацевтическая химия, учебник, том II:- Алматы: «Эверо», 2015.-640с.
3. Государственная фармакопея Республики Казахстан.-Алматы:«Жибек жолы», 2008.-Том 1.- 592с.
4. Государственная фармакопея Республики Казахстан.- Алматы:«Жибек жолы», 2009.-Том 2.- 804с.
5. Государственная фармакопея Республики Казахстан.-Алматы:«Жибек жолы», 2014.-Том 3.-729с.
6. Контроль качества и стандартизация лекарственных средств: методическое пособие / под ред. Раменской Г. В., Ордабаевой С. К.-М: I МГМУ; - Шымкент: ЮКГФА, 2015. - 285 с.
7. Ордабаева С.К. Анализ лекарственных препаратов, производных ароматических соединений: учебное пособие.-Шымкент: «Әлем», 2012.-250 с.
8. Раменская Г.В. Фармацевтическая химия: учебник.-М.: БИНОМ. Лаборатория знаний, 2015.-467 с.
9. Руководство к лабораторным занятиям по фармацевтической химии под редакцией Г.В. Раменской.-М.: Пилот, 2016.-352 с.
10. Халиуллин, Ф. А. Инфракрасная спектроскопия в фармацевтическом анализе: учебное пособие / - М.: ГЭОТАР-Медиа, 2017. - 160 с
11. Method validation in pharmaceutical analisis: a guide to best practice / editors dr. Joachim Ermer. - 2nd ed. - Germany: Wiley-VCH, 2015. - 418 p.
12. Watson, David G. Pharmaceutical analysis: a textboor for pharmacy students and pharmaceutical chemists / David G. Watson. - 4th ed. - Philadelphia: Elsevier, 2017. - 459 p.


**на казахском языке:**


1. Арыстанова Т.Ә. Фармацевтиқалық химия: оқулық.т.1-Алматы: «Әверо», 2015.-592 б.
2. Арыстанова Т.Ә. Фармацевтиқалық химия: оқулық.т.2-Алматы: «Әверо», 2015.-602б.

3. Қазақстан Республикасының Мемлекеттік фармакопеясы.-Алматы: «Жібек жолы», 2008.-1 Т.-592б.
4. Қазақстан Республикасының Мемлекеттік фармакопеясы.-Алматы: «Жібек жолы», 2009.-2 Т.-804б.
5. Қазақстан Республикасының Мемлекеттік фармакопеясы.-Алматы: «Жібек жолы», 2014.-3 Т.-709б.
6. Краснов, Е. А. Фармациялық химия сұрақтар мен жауаптар түрінде : оқу құралы = Фармацевтическая химия в вопросах и ответах: учебное пособие. - М.: ГЭОТАР-Медиа, 2016. - 704 с
7. Ордабаева С.К., Қарақұлова А.Ш. Глицирризин қышқылы тундыларының дәрілік препараттарының бірыңғайланған сапасын бақылау әдістемелерін жасау: ғылыми-әдістемелік нұсқау.-Шымкент: «Әлем».- 2013.-92 б.

**электронные ресурсы:**

1. Арзамасцев, А. П. Фармацевтическая химия [Электронный ресурс]: учеб. пособие / А. П. Арзамасцев. - Электрон. текстовые дан. ( 86,7 Мб). - М.: "ГЭОТАР-Медиа", 2011. - 640 с. эл. опт. диск (CD-ROM).
2. Контроль качества и стандартизация лекарственных средств [Электронный ресурс]: методическое пособие / под ред. Раменской Г. В., Ордабаевой С. К.-М: I МГМУ; Шымкент: ЮКГФА.-Электрон. текстовые дан. (4.91Мб). 2015. – 285 с.
3. Ордабаева, С. К. Анализ лекарственных препаратов, производных ароматических соединений Шымкент: «Әлем», 2012. - 300 с.
4. Ордабаева С.К., Каракулова А.Ш. Фармацевтикалық химия. Ароматты қосылыстар. [Электронды ресурс]: Окулык. / С. К. Ордабаева; А.Ш. Каракулова; ҚР денсаулық сақтау министрлігі. ОҚМФА. - Электронды мәтінді мәлімет (12.5Мб). - Шымкент: ОҚМФА,- Шымкент, 2016.-296 б.
5. Фармацевтическая химия [Электронный ресурс]: учебник / под ред. Т. В. Плетневой. - Электрон. текстовые дан. ( 50,6Мб). - М : ГЭОТАР-Медиа, 2017
6. The British Pharmacopoeia (BP 2016). – London The Stationery Office.-2016.
7. The European Pharmacopoeia 8.4.- EDQM.-2015.
8. The Japanese Pharmacopoeia, 16th edition.- 2013.
9. The International Pharmacopoeia, 5th ed. – Geneva: WHO.- 2015.
10. The United States Pharmacopeia, 38 National Formulary 33.-2015.

**дополнительная:**

1. Арыстанова Т.А., Арыстанов Ж.М. Инновационные технологии в фармацевтическом образовании: обучение и контроль. Учебно-методическое пособие. – Шымкент, 2012.-175с.
2. Краснов, Е. А. Фармацевтическая химия в вопросах и ответах: учебное пособие. - М.: "Литтерра", 2016. - 352 с.
3. Ордабаева С.К., Надирова С.Н. Унифицированные методики хроматографичсекого анализа лекарственных форм метронидазола: научно-методические рекомендации.-Шымкент: «Әлем», 2015. – 84 с.
4. Турсубекова, Б. И. Бейорганикалық дәрілік заттарды талдау: оқу құралы.- Алматы: «Эверо», 2016. - 120 бет. С
5. English for the pharmaceutical industry: textbook / M. Bucheler [and etc.]. - New York: Oxford University Press, 2014. - 96 p. +эл. опт. диск (CD-ROM).
6. Cairns, D. Essentials of pharmaceutical chemistry: textbook / D. Cairns. - 4th ed. - London: [s. n.], 2013. - 308 p
7. Georgiyants V.A., Bezugly P.O., Burian G.O., Abu Sharkh A.I., Taran K.A. Pharmaceutical chemistry. Lectures for Endlish-speaking students:Ph24 the study guide for students of higher schools – Kharkiv: NUPh; Original, 2013. – 527 p.