AL-FARABI KAZAKH NATIONAL UNIVERSITY

Faculty of Chemistry and Chemical Technology Department of Chemistry and Technology of

Organic Substances, Natural Compounds and Polymers

Approved

Dean of the Faculty

\_\_\_\_\_\_\_\_\_Ongarbaev E.K.

" " 2017

**EDUCATIONAL-METHODICAL COMPLEX OF DISCIPLINE**

**BH 3419 – “Bioorganic Chemistry”**

Specialty 6D072100 - Chemical technology of organic substances

Course – 1

Semester – 2 (spring)

number of credits - 3

Almaty, 2017

The discipline is compiled by Kipchakbayeva A.K. PhD, on the basis of the Study Curriculum on specialty 6D072100

Considered and recommended at the meeting of the Department of Chemistry and Technology organic substances, natural compounds and polymers

Minutes No. «\_\_ » \_\_\_ 2017 y.,

Head. the chair \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Mun G.A.

(painting)

Recommended by the Methodological Bureau of the faculty

Minutes No. 10 «\_\_» \_\_\_ 2011,  

Chairman \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Kumaragliyeva S.SH  
                                   (painting)

Начало формы

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| AL-FARABI KAZAKH NATIONAL UNIVERSITY  Faculty of Chemistry and Chemical Technology Department of Chemistry and Technology of  Organic Substances, Natural Compounds and Polymers  **EDUCATIONAL-METHODICAL COMPLEX OF DISCIPLINE**  **BH 3419 – “Bioorganic Chemistry”**  Specialty 6D072100 - Chemical technology of organic substances  **Sillabus**  Semester – 2 (spring)  **2017-2018 yy.** | | | | | | | | | | | | |
| Code of the discipline | | The name of discipline | Type | No. of hours per week | | | | Number of credits | | | ECTS | |
| Lecture |  | |  |
| BH 3419 | | **Bioorganic chemistry** | OK | 1,5 | 0 | | 3 | 4,5 | | | 7,5 | |
| Lecturer | | **Kipchakbayeva A.K., PhD** | | | | Office Hours | | | According to the  timetable | | | |
| **e-mail** | | aliya\_k85@mail.ru | | | |
| Phone (mob.) | | 87027558564 | | | | Office Room | | | 525 | | | |
| Assistant | | Gadetskaya Anastassiya, Ph.D. | | | | Office Room | | | According to the timetable | | | |
| e-mail | | [avg01.08@mail.ru](mailto:avg01.08@mail.ru) | | | |  | | | |
| Phone (mob.) | | 87017470048 | | | |  | | | 525 | | | |
| Type of training course | | Bioorganic chemistry is a fundamental discipline, the theoretical basis of medical education, a field of science that studies the electronic and spatial structure and mechanisms of functioning of biologically active compounds from a position with organic chemistry. the foundation of bioorganic chemistry is the chemistry of natural compounds.  **Course aim and objectives:**  **Aim:** bioorganic chemistry as a discipline is the formation of systematic knowledge of the relationship between the structure and chemical properties of biologically important classes of organic compounds, biopolymers and their structural components as a basis for understanding and understanding the essence of life processes at the molecular level.  **Task:** study of the structure and chemical synthesis of biologically active substances - elucidation of the relationship between the structure of biopolymers and their biological effect - study of chemical transformations, chemical modification of biologically active substances in order to penetrate their behavior in the body.  **Objects** of bioorganic study are the substances underlying the processes of life activity. Biopolymers and their structural components are biologically important high-molecular compounds: ugevody, proteins, nucleic acids and their monomers. Bioregulators, both natural and synthetic - chemical regulators of metabolic processes - vitamins, hormones, alkaloids, drugs. Bioorganic chemistry is designed to equip future specialists with knowledge of the molecular fundamentals of life processes, develop the logic of chemical thinking and skill in the classification, structure and properties of a large number of organic compounds of medicines. | | | | | | | | | | |
| Goal of the course | | is to gain familiarity with basic chemical principles, especially as they relate to biological systems. | | | | | | | | | | |
| Prerequisites | | Organic Chemistry, Standardization and certification of phytopreparations | | | | | | | | | | |
| Postrequisites | | Chemistry of Cyclic Compounds, Chemical Technology of Organic Substances | | | | | | | | | | |
| Expected learning outcomes (system generated competences) | | Knowledge and ability after passing of course: The future specialists in study of this course have to know about introduction of bioorganic chemistry; know the general laws relating the structure biologically active compounds, methods for major classes of compounds, the mechanism of the basic reaction types, obtaining technology of biologically active substances; be able to solve problems associated with the technology of biological active substances, identify the compound.  The student has to know:  • Be able to use scientific, reference, methodical literature on the specialty national and foreign languages; develop the personal qualities (ability) for self-learning at the end of the training program, to expand their knowledge based information and educational technologies; demonstrate knowledge and understanding of the methodological foundations of the most advanced knowledge in all sections of chemical technology of organic substances and the organizational and economic bases activities of enterprises.  The student has to be able:  • have the ability to timely perception, analysis and interpretation of scientific information within the chemical sciences and related fields, scientific directions;  • know the general laws relating the structure and properties of bioorganic compounds, methods for major classes of compounds, the mechanism of the basic reaction types, environmental biologically active substances;  • be able to solve problems associated with the technology of biologically active substances and identify the compound; | | | | | | | | | | |
| Literature | | **Study literature:**   1. H. Stephen Stoker General, Organic, and Biological Chemistry 5th Edition. 2. Kenneth W. Raymond General, Organic, and Biological Chemistry: An Integrated Approach 2nd Edition. 3. H. Stephen Stoker Organic, and Biological Chemistry 2nd Edition. 4. David Van Vranken and Gregory Weiss Introduction to Bioorganic Chemistry and Chemical Biology 5. Donald Voet, Judith G. Voet Biochemistry, 4th Edition. 6. Ch. Pratt and K. Cornly, Essential Biochemistry, 3d edition.   7. Fromm, Herbert J., Hargrove, Mark Essentials of Biochemistry, 2012th edition. | | | | | | | | | | |
| Academic policy | | Mandatory implementation of the academic syllabus. Compliance with deadlines and delivery tasks (home, many foreign, control, laboratory, design, etc.), Delivery of projects, examinations.  Discipline (compulsory attendance, the inadmissibility of the delay). Ready for school and social interaction and cooperation in the group. | | | | | | | | | | |
| Policy of evaluation and attestation | | 1. Assessment work in the audience at the seminar. Evaluation of laboratory exercises Evaluation of the implementation of seminars. Evaluation of the SWS (project / case study / program / ...) Estimation of formation of competence (control of landmark, examinations). The formula for calculating the final grade. 1. The SWS will be distributed during the semester - 6 tasks in the discipline, which constitute 60% of the final mark of the course 2. SWS surrendered a week later will be accepted, but the estimate has been reduced by 50% 3. Topics to be included in the SWS exam questions 4. During the period of 1-7 weeks is necessary to perform 3 SWS tasks (each task 10 points). 5. During the period of 8-15 weeks 3 SWS perform tasks on 10 points each 6. Laboratory works - 6 synthesis, 3 on each of the LC on 10 points each work. 7. Securing the lecture material and practical tasks in the seminars - 30 points in each of the LC 8. Landmark control (LC) -10 points each. 9. Midterm Exam held on lectures and seminars, the SWS for 1-7 weeks and 1 practical assignment (to be drawn up on the three issues the tickets)   **Criterial evaluation:**  Description of the work Percentage Completion time Laboratory work 70% 1 - 15  Assessment 30% 7, 14  Exam 40% 8,16  TOTAL 100%  **Summative estimation:**  The final score will be calculated by the formula:  Final grade = 0,3 (Short Exam 1 + Short Exam 2) + 0,1 Midterm Exam + 0,3 Final Exam  Evaluation scheme in percentage:  95% - 100%: A 90% - 94%: A- 85% - 89%: B+  80% - 84%: B 75% - 79%: B- 70% - 74%: C+  65% - 69%: C 60% - 64%: C- 55% - 59%: D+  50% - 54%: D- 0% -49%: F | | | | | | | | | | |
| Calendar for the implementation of the training course content | | | | | | | | | | | | |
| Week/  date | Topic title (lecture, practical classes, ISW) | | | | | | | | | No. of  hours | | Maximum  Score |
| 1 | Lecture 1. Introduction. Bioorganic chemistry and the Unity of Life. | | | | | | | | | **1** | |  |
| Laboratory 1. Laboratory Safety. | | | | | | | | | **4** | |  |
| **2-3** | Lecture 2-3. Biopolymers and their structural components. Amino acids, structure, properties. | | | | | | | | | **2** | |  |
| Laboratory 2-3. Preparation of acetyl salicylic acid. . Preparation of acetyl salicylic acid. Continued. | | | | | | | | | **4** | |  |
| ISWT: Submission of the task 1  (Nomenclature of main biomolecules) | | | | | | | | |  | | **7** |
| **4-5** | Lecture 4-5. Carbohydrates and their classification. Determine the carbohydrates, quantitative and qualitative analysis. | | | | | | | | | **2** | |  |
| Laboratory 4-5. Extraction of a known mixture. Extraction of a known mixture. Continued. | | | | | | | | | **8** | |  |
| ISWT: Submission of the task 2  (Difference in use of detergents based on) | | | | | | | | |  | | **7** |
| 6,7,8 | Lecture 6-7-8. Polyphenol compound and their classification. Flavonoids | | | | | | | | | **3** | |  |
|  | Laboratory 6. Extraction of an unknown mixture. Extraction of an unknown mixture. Continued. | | | | | | | | | 12 | | 6 |
|  | ISWT: Submission of the task 3 (Functional groups in biological molecules) | | | | | | | | |  | | **7** |
|  | (Short Exam 1) | | | | | | | | |  | | **21** |
|  | **Midterm Exam** | | | | | | | | |  | | **100** |
| **9-10** | Lecture 9-10. Vitamins and Lipids | | | | | | | | | **2** | |  |
|  | Laboratory 6. Synthesis of acetanilide. | | | | | | | | | **8** | |  |
| **11-12** | Lecture 11-12. Essential oil. Terpenes: monoterpenes and sesquiterpenes | | | | | | | | | **2** | |  |
|  | Laboratory 11-12. Recrystallization of acetanilide. | | | | | | | | | **8** | |  |
|  | ISWT: Submission of the task 5  (Molecular diseases) | | | | | | | | |  | | **7** |
| **13** | Lecture 13. Alkaloids and their classification | | | | | | | | | **1** | |  |
|  | Laboratory 13. The synthesis of soap. | | | | | | | | | **4** | |  |
|  | ISWT: Submission of the task 6  (Cell structure and organization) | | | | | | | | |  | | **7** |
| **14** | Lecture 14. Saponins. Structure. Qualitative reaction. Biological activity. | | | | | | | | | **1** | |  |
|  | Laboratory 14. Essential oils of plants. | | | | | | | | | **4** | |  |
|  | ISWT: Submission of the task 7  (Protein Sequencing) | | | | | | | | |  | | **7** |
| **15** | Lecture 15. Determination of cardiac glycosides. Classification. | | | | | | | | | **1** | |  |
|  | ISWT: Submission of the task 7  (Cell structure and organization) | | | | | | | | |  | | **6** |
|  | Коллоквиум | | | | | | | | |  | | **21** |
|  | Short Exam 2 | | | | | | | | |  | | **100** |
|  | **Exam** | | | | | | | | |  | | **100** |
|  | **Total** | | | | | | | | |  | | **400** |

Lecturer Kipchakbayeva A.K.

Head of the Department Mun G.A.

Chairman of the Methodical Bureau of the Faculty Kumaragliyeva S.SH  
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