AL-FARABI KAZAKH NATIONAL UNIVERSITY

Higher School of Medicine

Department of Fundamental Medicine

 AFFIRM

Dean of the Faculty

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (signature)

Kalmatayeva Z.A.

"\_\_\_\_\_\_" \_\_\_\_\_\_\_\_ 2021

EDUCATIONAL AND METHODICAL COMPLEX OF DISCIPLINE

**OTM** **5302 “Omics” technologies in medicine and pharmacy**

7M101 Health care

Educational program "7M10117 - Pharmacy"

Course – 1

Semester – 2

Number of credits – 5 (5 ECTS)

Аlmaty 2021

Educational and methodical complex of discipline was compiled by PhD **I. Pinskiy**

Based on the working curriculum in the specialty 7M101 Health care

Considered and recommended at a meeting of the department fundamental medicine

from "\_\_\_" \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2021, protocol No. ...

Head of the department \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Sarsenova L.K.

(signature)

Recommended by the faculty methodical bureau

"\_\_\_\_" \_\_\_\_\_\_\_\_\_\_\_ 20 ..., protocol No.

Chairman of the method bureau of the faculty \_\_\_\_\_\_\_\_\_\_\_ Full name (signature)

**Al-Farabi Kazakh National University**

**Faculty of Medicine and Social Healthcare**

**Higher School of Medicine**

**Department of Fundamental Medicine**

**SYLLABUS**

Spring semester, academic year 2020-2021, English division

**Academic course information**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Discipline’s code** | **Discipline’s title** | **Type** | **No. of hours per week** | | | | **Number of credits** | **ECTS** |
| Lect. | Pract. | | Lab. |
| **OTM 5302** | “Omics” technologies in medicine and pharmacy | MD  UC | 1 | 2 | | 0 | 5 | 5 |
| **Lecturer** | Pinskiy Ilya Vladimirovich | | | | **Office hours** | | According to schedule | |
| **e-mail** | ilya.pinskiy@gmail.com | | | |
| **Phone number** | 87472431895 | | | | **Auditorium** | | Faculty of Biology and Biotechnology | |
| **Teacher** | Pinskiy Ilya Vladimirovich | | | | **Office hours** | | According to schedule | |
| **e-mail** | ilya.pinskiy@gmail.com | | | |
| **Phone number** | 87472431895 | | | | **Auditorium** | | Faculty of Biology and Biotechnology | |

|  |  |
| --- | --- |
| **Academic presentation of the course** | **Course type:** major discipline of university component from the module M-4 “Pharmaceutical researcher in the field of the circulation of medicines and medical devices”.  **Aim of discipline:** to get in-depth knowledge of "Omics" technologies used in medicine.  **After completing this course students will**:  -to have an idea of the modern "omics" technologies  - correctly choose one of the research methods for solving the stated experimental and theoretical problems  - describe “proteomics”,  - highlight signs and draw conclusions on protein microchips, etc.  -classify "Omics" technologies in the context of clinical diagnosis.  - to find the relationship between omics technologies and personalized medicine.  -demonstrate knowledge of the use of omix technologies.  -describe a group of monogenic and multifactorial diseases.  - understand the methods for obtaining and analyzing experimental data. |
| **Prerequisites** | Organization and planning of scientific research in pharmaceutical chemistry. |
| **Post requisites** | Research Methodology in pharmacy. Pharmacist critical thinking. |
| **Information resources** | **Basic literature**:  1. Mambetpayeva, B. S. Basics of Biomedicine: training aid / B. S. Mambetpayeva ; Ministry of Health of the Republic of Kazakhstan. - Astana : Ақнұр, 2017. - 197 p. - URL: http://elib.kaznu.kz/order-book. - ISBN 978-601-7894-91-7  2. Beketayeva, Assel Orozalievna. Mathematical Modeling of the Biomedical Processes : study book / A. O. Beketayeva ; Al-Farabi Kazakh National University. - Almaty : Qazaq University, 2018. - 106 p. : il. - URL: http://elib.kaznu.kz/order-book. - Bibliogr. at the end of sections. - 100 (circulation) экз. - ISBN 978-601-04-3730-2  3. Genetics : textbook / D. K. Aydarbaeva, K. K. Muhambetzhanov, Z. S. Kenzhebaeva [et al.] ; Ministry of Education and Science of the Republic of Kazakhstan. - Almaty : Association of Higher Educational Institutions of Kazakhstan, 2016. - 243 p. : il. - URL: http://elib.kaznu.kz/order-book. - Bibliogr.: p. 229-230. - 1000 (circulation) экз. - ISBN 978-601-217-586-8  4. Zhussupova, Aizhan Izbasarovna. PCR – Diagnostics : educational manual / A. I. Zhussupova ; Al-Farabi Kazakh National University. - Almaty : Qazaq university, 2016. - 127, [1] p. - URL: http://elib.kaznu.kz/order-book. - Bibliogr.: р. 124. - ISBN 978-601-04-1237-8  5. Nanobiotechnology: inorganic Nanoparticles vs Organic Nanoparticles / Instituto de Nanociencia de Aragon-ARAID, Universisdad de Zaragoza ; ed. by J. M. de la Fuente, V. Grazu. - Amsterdam ; Boston ; Heidelberg : Elsevier, 2012. - 520 p. : il. - (Frontiers of Nanocience. Vol. 4). - URL: http://elib.kaznu.kz/order-book. - Ind.: p. 509-520. - ISBN 978-0-12-415769-9  **Additional literature:**  1. Vlahou et al. Integration of Omics Approaches and Systems Biology  for Clinical Applications / 2018 John Wiley & Sons, Inc. – 382 p.  2. Yu Liu. OMICS in Clinical Practice / 2014 by Apple Academic Press, Inc. – 456 p.  3. Barh D., Blum K., Madigan M.A. OMICS. Biomedical Perspectives and Applications / 2012 by Taylor & Francis Group, LLC. – 516 p.  4. Clark, David P. Biotechnology: Applying the Genetic Revolution : textbook / D. Clark, N. Pazdernik. - Amsterdam ; Boston ; Heidelberg : Elsevier, 2009. - 762 p. - URL: http://elib.kaznu.kz/order-book. - ISBN 978-0-12-175552-2  **Internet resources:**  1. Lecturio.com  <https://www.lecturio.com>  2. Taylor and Francis Online  <https://www.tandfonline.com/action/doSearch?AllField=omics&SeriesKey=iedc20&pageSize=10&subjectTitle=&startPage=0>  3. “Human Genome” Project <https://web.ornl.gov/sci/techresources/Human_Genome/project/info.shtml>  4. NCBI - The National Center for Biotechnology Information, USA <https://www.ncbi.nlm.nih.gov/>  5. NDB - a portal for three-dimensional structural information about nucleic acids <http://ndbserver.rutgers.edu/>  6. OMIM - compendium of human genes and genetic phenotypes <https://www.ncbi.nlm.nih.gov/omim?db=OMIM>  7. Ensembl - Genome browser for vertebrate genomes <http://asia.ensembl.org/index.html>  8. EMBL-EBI - European Bioinformatics Institute  <https://www.ebi.ac.uk/>  9. Video lectures by Molecular Biology:  <https://www.khanacademy.org/>  10. Coursera  <https://www.coursera.org/> |
| **Academic policy of the course in the context of the University moral and ethical values** | **Academic behavior rules.**  *Attendance policy*  Attendance for lectures and workshops is mandatory. Attendance for an  additional extracurricular research activity is highly recommended for  increasing the course assessment. No less than 50% attendance is  required for the lectures and workshops. Additional research activities are  not required, but highly beneficial for the course better comprehension.  *Class participation*  All students are expected to participate in class activities and discussions.  *Classroom decorum*  All unrelated activities are prohibited during a lecture and workshop time.  Cell phones, computer games and unrelated Internet and computer  activities are strictly prohibited.  *Missed exams*  Students can retake midterm exams with an official document for the days of  absence. Other excuses are not accepted and the exam will be annulated. Missing of the final exam is registered according the rules of Academic Policy of the University.  *Late assignments*  Late assignments, projects, reports and etc. are not accepted with no excuses.  *Appeals policy*  Students may appeal instructor decisions by speaking directly with him. If a solution is not found students can consult with Head of the Department.  *Electronic resources*  You are expected to regularly check your emails for updates and announcements  about the course.  *Plagiarism and Cheating*  As a student, you are expected to adhere to  the norms of academic integrity. Academic dishonesty includes  plagiarism, cheating, fabrication, unauthorized collaboration, use of  notes during exams and quizzes, and other forms. These students  will be given 0 with no further retake activities.  **Academic values.**  *Academic honesty*  There will be no tolerance for lapses of academic integrity. A  student found to be guilty of falsifying, plagiarism and cheating or  any other form of academic dishonesty will be given a failing  grade.  *Tolerance and non-discrimination*  There is zero tolerance for unsafe activity in laboratory during  workshops and additional research activities. There will be no  discrimination per nationality, gender and anything else. |
| **Evaluation and attestation policy** | **Criteria-based evaluation:** evaluation of study results in accordance with the descriptors, test of competencies (the results of study that are indicated in goal of the course) at border control and examinations.  **Testing** (open or closed questions) with situational tasks, diagrams, molecular formulas) - current / midterm / final control: learning outcomes No. 1-8  **Written / oral quiz** - current / midterm / final control: learning outcomes No. 1-8  **Group Problem solving (cases**) - current control: learning outcomes No. 1-8  **Direct observation** - current control /SIW: learning outcomes No. 9-11  **Summative evaluation:**  1. 30 lessons will be held during the course. The maximum score that can be obtained in one lesson for right answers by case-study questions equals to 10 points. Points for the classwork will constitute about 30% of the final course grade.  For the Self Work of Student (ISW) students can get maximum 10 points additionally to the final course grade.  2. Colloquium examinations will be held in test and written form on the 5th, 10th and 15th week. Score for each control examination is 40-50 points and equals about 30% of the final course grade. Exam questions will be based on the course material.  3. Final examination will be held in written form and constitute 40% of the final course grade.  Final course grade is calculated in accordance with Academic policy of the University by the following formula:  (CC1+МТ+CC2/3)х0,6+(FEх0,4),  where CC1 is Current Control 1,  MT is MidTerm,  CC2 is Current Control 2,  FE is Final Examination.  Students who take less than 50% of the final course grade by the results of current control (CC1+МТ+CC2/3) will not be admitted to final examination. |

**Calendar (schedule) of the implementation of the course content**

*Coursework calendar*

|  |  |  |  |
| --- | --- | --- | --- |
| **Week** | **Topic** | **Hours** | **Max. point** |
|  | Lecture 1. Introduction to “Omics” technologies. | 1 | 0 |
| Seminar 1. Introduction to “Omics” technologies. | 2 | 3 10 |
| 2 | Lecture 2. Structural genomics. Human genome. | 1 | 0 |
| Seminar 2. Structural genomics. Human genome. | 2 | 3 10 |
| 3 | Lecture 3. Functional genomics. | 1 | 0 |
| Seminar 3. Functional genomics. | 2 | 3 10 |
| 4 | Lecture 4. Epigenomics. | 1 | 0 |
| Seminar 4. Epigenomics. | 2 | 3 10 |
| 5 | Lecture 5. Farmacogenomics. | 1 | 0 |
| Seminar 5. Farmacogenomics. | 1 | 33              10 |
| **Colloquium 1.** | **1** | **50** |
| **Current Control 1** |  | **100** |
| 6 | Lecture 6. Genomic methods of research and diagnostics. | 1 | 0 |
| Seminar 6. Genomic methods of research and diagnostics. | 2 | 3 10 |
| 7 | Lecture 7. Transcriptomics. Methods of transcriptome investigation. | 1 | 0 |
| Seminar 7. Transcriptomics. Methods of transcriptome investigation. | 2 | 7 10 |
| 8 | Lecture 8. Proteomics and methods of proteome investigation. | 1 | 0 |
| Seminar 8. Proteomics and methods of proteome investigation. | 2 | 10 |
| 9 | Lecture 9. Interactomics (the research of protein-protein interactions). | 1 | 0 |
| Seminar 9. Interactomics (the research of protein-protein interactions). | 2 | 3 10 |
| 10 | Lecture 10. Glycomics. | 1 | 0 |
| Seminar 10. Glycomics. | 1 | 10 |
| **Colloqium 2.** | **1** | **25 50** |
| **Current Control 2** |  | **100** |
| 11 | Lecture 11. Lypidomics. | 1 | 0 |
| Seminar 11. Lypidomics. | 2 | 3 10 |
| 12 | Lecture 12. Regulomics and metabolomics. | 1 | 0 |
| Seminar 12. Regulomics and metabolomics. | 2 | 10 |
| 13 | Lecture 13. Bioinformatics. | 1 | 0 |
| Seminar 13. Bioinformatics. | 2 | 10 |
| 14 | Lecture 14. Personalized medicine (the future of medicine). | 1 | 0 |
| Seminar 14. Personalized medicine (the future of medicine). | 2 | 10 |
| 15 | Lecture 15. The development of new drugs by using the omics technologies. | 1 | 0 |
| Seminar 15. The development of new drugs by using the omics technologies. | 1 | 10 |
| **Colloquium 3** | **1** | **3 40** |
| **ISW.** Passing the online omics course in Coursera. | **2** | **3 10** |
| **Current Control 3** |  | **100** |
|  | **TOTAL** |  | **300** |

Head of the Department \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Sarsenova L.K.

Chairman of Faculty’s Methodical Bureau \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ualiyeva A. E.