**SYLLABUS**

**Fall semester 2021-2022 academic years**

**on the educational program “Virology”**

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| **Discipline’s code** | **Discipline’s title** | **Independent work of students (IWS)** | **No. of hours per week** | | | | | **Number of credits** | **Independent work of student with teacher (IWST)** |
| **Lectures (L)** | **Practical training (PT)** | | **Laboratory (Lab)** | |
| UVZ5208 | Bacteriophages | 98 | 15 | 30 | |  | | 5 | 5 |
| **Academic course information** | | | | | | | | | |
| **Form of education** | **Type of course** | **Types of lectures** | | | **Types of practical training** | | **Number of IWS** | | **Form of final control** |
| Distance (online) | Elective | Informative, lecture-discussion | | | Seminar-talk, seminar discussion, analysis, logical task | | 5 | | Written examination, assignments on msteams or zoom, online |
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| Telephone number | 8 701 703 9601 | | | | | |

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| **Academic presentation of the course** |

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| **Aim of course** | **Expected Learning Outcomes (LO)**  As a result of studying the discipline the graduate will be able to: | **Indicators of LO achievement (ID)**  (for each LO at least 2 indicators) |
| to describe the basic knowledge about bacteriophages. To investigate the biology of bacteriophages, their therapeutic uses focusing in particular on factors that impact the outbreak and spread of human viral diseases. | 1. To describe the basic structures and replication strategies of the major classes of bacteriophages; | 1.1 Describe the scientific method and the distinction between discovery-based research and hypothesis-based research |
| 1.2 Define the research areas of Genomics, Bioinformatics and Computational Biology, and understand the fundamental questions addressed by these research areas |
| 2. To explore and analyze the political, social, economic and biological factors | 2.1 To understand the size, shape and structure of phage |
| 2.2 Formulate a scientific hypothesis, design an experiment to test that hypothesis, and critically evaluate the results. |
| 3. To demonstrate familiarity with the specialized vocabularies and fundamental concepts of the various disciplines; | 3.1 To describe basic knowledge about the main stages of epidemiological analyses Explain the basic principles of gene expression, translation |
| 3.2 Understand that information about evolutionary relationships is used to infer gene function; relate the evolutionary analyses used for this project to broader evolutionary theory. |
| 4. To show an appreciation of how different academic disciplines can supplement and reinforce one another in the study of bacteriophages; | 4.1 Understand the mechanisms that bacteriophages and bacteria use to exchange genes and relate those analyses to the underlying molecular basis of infectious diseases. |
| 4.2 To know of use the disciplines under study for advanced analysis in a way that is not normally available to each discipline alone. |
| 5. To apply the acquired knowledge, skills and competencies in research activities | 5.1 To predict professional competence of a research scientist in the field of "Bacteriophages" |
| 5.2 To recognize ability as a research scientist in the field of "Bacteriophages" |
| **Prerequisites** | Microbiology | |
| **Post requisites** | Thesis defense | |
| **Information resources** | 1. 1. Principles of Virology. By S. Jane Flint, Vincent R. Racaniello, Glenn F. Rall, Anna Marie Skalka, Lynn W. Enquist (2020) 2. 2. Кузнецова, Е. А. Микробиология. Часть 1: учебное пособие / Е. А. Кузнецова, А. А. Князев. — Казань: Казанский национальный исследовательский технологический университет, 2017. — 88 c. ЭБС IPRbooks 3. 3. Ткаченко, К. В. Микробиология: учебное пособие / К. В. Ткаченко. — 2-е изд. — Саратов: Научная книга, 2019. — 159 c   4. Virology: Principles and Applications by Carter and Saunders, 2nd edition (2013)  5. Molecular and Cellular Biology of Viruses, 1st Edition. Phoebe Lostroh (2019)  6. “Understanding viruses” Teri Shors. 2nd ed. Burlington: Jones & Bartlett Learning, cop. (2013) | |

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| **Academic policy of the course in the context of university moral and ethical values** | **Academic Behavior Rules:**  Teaching is carried out as lectures, seminars and IWS, IWST. Participation in seminars is compulsory.  ATTENTION! Non-compliance with deadlines leads to loss of points! The deadline of each task is indicated in the calendar (schedule) of implementation of the content of the curriculum.  **Academic values:**  - Practical trainings/laboratories, IWS should be independent, creative.  - Plagiarism, forgery, cheating at all stages of control are unacceptable.  - Students with disabilities can receive counseling at e-mail oksana.yurikova@kaznu.kz  Academic values:  Academic honesty and integrity: independent performance of assignments; inadmissibility of plagiarism, forgery, cheating at all stages of the knowledge control, and disrespectful attitude towards teachers. (The code of KazNU Student’s honor) |
| **Evaluation and attestation policy** | **Criteria-based evaluation:**  assessment of learning outcomes in relation to descriptors (verification of the formation of competencies in midterm control and exams).  **Summative evaluation:** assessment of work activity in an audience (at a webinar); assessment of the completed task. |

**CALENDAR (SCHEDULE) THE IMPLEMENTATION OF THE COURSE CONTENT:**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| week | Topic name | LO | ID | amount of hours | Maximum score | Form of Knowledge Assessment | The  Form of the lesson  / platform |

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| Module **1** | | | | | | | |
| 1 | **L.1** Introduction toBacteriophage genomes | LО 1 | ID 1.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 1** Nobel prizes awarded for phage research | LО 1 | ID 1.2. | 2 | 8 | Analysis | Webinar  in MS Teams |
| 2 | **L.2** Classification. History | LО 2 | ID 2.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 2** Uses of bacteriophages. Phage therapy | LО 2 | ID 2.2. | 2 | 8 | Analysis | Webinar  in MS Teams |
| 3 | **L.3** Principles of Bacteriophage, biological properties | LО 3 | ID 3.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 3** Phage shape, size, structure and Replication | LО 1 | ID 1.2. | 2 | 9 | Analysis | Webinar  in MS Teams |
|  | IWSP 1 Consultation on the implementation of IWS1 |  |  |  |  |  |  |
|  | **IWS 1.** Problem-oriented tasks for IWS on the thematic block 1. Look the file with the IWS tasks. Forms of representation of results of performance of IWS: protection orally. | LО 5 | ID 5 |  | 25 | Logic task | Webinar  in MS Teams |
| **Module П** | | | | | | | |
| 4 | **L.4** Replication. Attachment and penetration | LО 3 | ID 3.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 4** Synthesis of proteins and nucleic acid. Virion assembly. Release of virions. Communication | LО 3 | ID 3.2. | 2 | 10 | Analysis | Webinar  in MS Teams |
| 5 | **L.5** Genome structure. Systems biology | LО 3 | ID 3.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 5** In the environment. In humans | LО 3 | ID 3.2. | 2 | 10 | Analysis | Webinar  in MS Teams |
|  | IWSP 2 Consultation on the implementation of IWS2 |  |  |  |  |  |  |
|  | **IWS 2.** Problem-oriented tasks for IWS on the thematic block Look the file with the IWS tasks. | LО 5 | ID 5 |  | 30 | Logic task | Webinar  in MS Teams |
|  | **MT 1** | **LО 1** | **ID 1.1.** |  | **100** |  |  |
| 6 | **L.6** Commonly studied bacteriophage | LО 3 | ID 3.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 6** Interrelation between phage and bacteria: Virulent phage; lysogenic phage; transposon | LО 3 | ID 3.2. | 2 | 8 | Analysis | Webinar  in MS Teams |
| 7 | **L.7** Description of the mycobacteriophage L5 genome | LО 2 | ID 2.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT7** Description of the insights that have come from phage hunting | LО 5 | ID 5.1. | 2 | 8 | Analysis | Webinar  in MS Teams |
| 8 | **L.8** Bacteriophage Life Cycle. Lytic Cycle. Lysogenic Cycle | LО 2 | ID 2.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 8** What kind of treatments can be used with bacteriophages | LО 1 | ID 1.1. | 2 | 9 | Analysis | Webinar  in MS Teams |
|  | IWSP 3 Consultation on the implementation of IWS3 |  |  |  |  |  |  |
|  | **IWS 3** Problem-oriented tasks for IWS on the thematic block Look the file with the IWS tasks. | LО 5 | ID 5.1. |  | 25 | Logic task | Webinar  in MS Teams |
| 9 | **L.9** Facts of bacteriophages | LО 3 | ID 3.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 9** Production of bacteriophages | LО 3 | ID 3.2. | 2 | 10 | Analysis | Webinar  in MS Teams |
| 10 | **L.10** Bacteriophages: future of the medicine | LО 1 | ID 1.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 10** Bacteriophages: future of the medicine | LО 1 | ID 1.2. | 2 | 10 | Analysis | Webinar  in MS Teams |
|  | IWSP 4 Consultation on the implementation of IWS4 |  |  |  |  |  |  |
|  | **IWS 4** Problem-oriented tasks for IWS on the thematic block Look the file with the IWS tasks. | LО 5 | ID 5.1. |  | 30 | Problem task | Webinar  in MS Teams |
|  | **МТ (Midterm Exam)** | **LО 1** | **ID 1.1.** |  | **100** |  |  |
| 11 | **L.11** How bacteriophages work | LО 1 | ID 1.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 11** Paper discussion | LО 1 | ID 1.2. | 2 | 12 | Analysis | Webinar  in MS Teams |
| 12 | **L.12** Viruses of bacteria-bacteriophages, their use. | LО 1 | ID 1.1. | 1 |  |  | Webinar  in MS Teams |
|  | **PT 12** Paper discussion | LО 1 | ID 1.2. | 2 | 12 | Analysis | Webinar  in MS Teams |
|  | IWSP 5 Consultation on the implementation of IWS5 |  |  |  |  |  |  |
|  | **IWS 5** Problem-oriented tasks for IWS on the thematic block Look the file with the IWS tasks. | LО 5 | ID 5.1. |  | 40 | Problem task | Webinar  in MS Teams |
| 13 | **L.13** Types of bacteriophages | LО 1 | ID 1.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 13** Antibiotics and bacteriophages | LО 1 | ID 1.2. | 2 | 12 | Analysis | Webinar  in MS Teams |
| 14 | **L.14** Evolution | LО 2 | ID 2.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 14** Types of bacteriophages. | LО 1 | ID 1.2. | 2 | 12 | Analysis | Webinar  in MS Teams |
| 15 | **L.15** Therapeutic bacteriophages | LО 2 | ID 2.1. | 1 |  |  | Video lecture  in MS Teams |
|  | **PT 15** Paper discussion | LО 1 | ID 1.2. |  | 12 | Analysis | Webinar  in MS Teams |
|  | **RC 2** | **LО 4** | **ID 4.1.** |  | **100** |  |  |

[Abbreviations: QS - questions for self-examination; TK - typical tasks; IT - individual tasks; CW - control work; MT - midterm.

Comments:

- Form of L and PT: webinar in MS Teams / Zoom (presentation of video materials for 10-15 minutes, then its discussion / consolidation in the form of a discussion / problem solving / ...)

- Form of carrying out the CW: webinar (at the end of the course, the students pass screenshots of the work to the monitor, he/she sends them to the teacher) / test in the Moodle DLS.

- All course materials (L, QS, TK, IT, etc.) see here (see Literature and Resources, p. 6).

- Tasks for the next week open after each deadline.

- CW assignments are given by the teacher at the beginning of the webinar.]

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