**SYLLABUS**

**Fall semester 2021-2022 academic years**

**on the educational program “8D05101 - Biology”**

**Doctor’s degree 1 year, 1 semester**

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| **Discipline’s code** | **Discipline’s title** | **Independent work of students (IWS)** | **ee** | | | | | **Number of credits** | **Independent work of student with teacher (IWST)** |
| **Lectures (L)** | **Practical training (PT)** | | **Laboratory (Lab)** | |
| **MNI 7202** | **Research methodology** | 4 | 15 | 15 | | 0 | | 3 | 56 |
| **Academic course information** | | | | | | | | | |
| **Form of education** | **Type of course** | **Types of lectures** | | | **Types of practical training** | | **Number of IWS** | | **Form of final control** |
| offline | Theoretical | problematic,  analytical lecture | | | solving problems,  situational tasks | | 4 | | Exam  writing |
| Lecturer | Amirova Aigul, candidate of biological science | | | | | |  | | |
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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 undergraduate will be able to: | **Indicators of LO achievement (ID)**  (for each LO at least 2 indicators) |
| "Research methodology" provides teaching to doctoral students depth knowledge about the development of scientific and technological progress, training  a qualified professional implies the acquisition of skills like  independent scientific work and research activities as part of  collective, which is impossible without mastering the methodology and methods of scientific research. | Understand the foundations of the fundamental sciences on which modern biotechnology is based in accordance with the specialty and specialization. | -explain the relationship of modern biotechnology with other disciplines;  -summarize the achievements of modern biotechnology.  - master the procedure for setting up an optimal experiment and processing measurement results |
| Understand the essence of advanced technologies in the professional activities of a specialist in biotechnology; modern methods of biotechnology. | -apply the progressive biotechnology within the professional activity in the specialty of biotechnology;  -master the methodological foundations of scientific knowledge and creativity in practice. |
| Improve qualifications in the professional field of biotechnology; in scientific and pedagogical work by the specialty. | -apply the acquired knowledge in the professional field of biotechnology;  -use the acquired knowledge and skills in scientific and pedagogical work by the specialty. |
| Summarize the information obtained from literary sources on biotechnology and related sciences. | -analyze the information obtained from literary sources;  -master the modern information on the biotechnology and related sciences. |
| Plan and manage projects; be able to find and make decisions among different opinions. | - compose the projects and manage of them;  - identify the problems, find and make decisions in the context of different opinions. |
| **Prerequisites** | “General and Molecular Genetics”, "Biochemistry", "Molecular Biology", "Genetic Engineering". | |
| **Post requisites** | Master students can use an evolutionary approach in solving the specific scientific problems. | |
| **Information resources** | *Main:*  1.Космин, В. В. Основы научных исследований (Общий курс) [текст] : учеб. пособие . - 2-е изд. - M. : Риор, 2014. - 214 с.  2. Герасимов, Борис Иванович. Основы научных исследований. - Москва ; Москва : Издательство "ФОРУМ" : ООО "Научно-издательский центр ИНФРА-М", 2013. - 272 с.  3. Леонова, Ольга Владимировна. Основы научных исследований. - 1. - Москва : Московская государственная академия водного транспорта (МГАВТ), 2015. - 72 с. | |

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| **Academic policy of the course in the context of university moral and ethical values** | **Academic Behavior Rules:**  All students have to register at the MOOC. The deadlines for completing the modules of the online course must be strictly observed in accordance with the discipline study schedule.  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, as well as in the MOOC.  **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 \*\*\*\*\*\*\*@gmail.com. |
| **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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| weeks | 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** Introduction to Research methodology | | | | | | | |
| 1 | **L.1** Introduction. Goals and tasks of the discipline Research methodology | LО 1 | ID 1.1. | 1 |  |  | offline |
| 1 | **PT 1** Science as a system of knowledge | LО 1 | ID 1.1. | 1 | 9 | Analysis | offline |
| 2 | **L.2** Scientific Research Methods | LО 1 | ID 1.2.  ID 1.3. | 1 |  |  | offline |
| 2 | **PT 2** Research methods. Definitions. | LО 1 | ID 1.1. | 1 | 9 | Analysis | offline |
| 3 | **L.3** Theoretical research work | LО 1 | ID 1.1. | 1 |  |  | offline |
| 3 | **PT 3** Empirical and theoretical levels  scientific knowledge | LО 1 | ID 1.1. | 1 | 9 |  | offline |
| 3 | **IWSP 1 Consultation on the implementation of IWS1** | LО 1 |  | 1 |  |  | offline |
| 3 | **IWS 1.** Topics: Typology of research methods. 2. Theoretical research methods (induction,  concretization, analogy, comparison, classification, analysis, synthesis). | LО 1 | ID 1.6. |  | 25 | Logic task |  |
| **Module П** Direction and stages scientific research work | | | | | | | |
| 4 | **L.4** Experimental research work. | LО 1 | ID 1.4. | 1 |  |  | offline |
| 4 | **PT 4** Organization  research process | LО 1 | ID 1.1. | 1 | 9 |  | offline |
| 5 | **L.5** Direction and stages scientific  research. | LО 1 | ID 1.6. | 1 |  |  | offline |
| 5 | **PT 5** Give a definition to such categories of theoretical knowledge as "thinking", "mind",  "concept", "judgment", "inference", "intuition". | LО 2 | ID 2.1.  ID 2.2.  ID 2.3. | 1 | 9 |  | offline |
| 5 | **IWSP 2 Consultation on the implementation of IWS2** |  |  | 1 |  |  | offline |
| 5 | **IWS 2 Test** | LО 1 | ID 1.6. |  | 20 | Logic task |  |
| 5 | **Make a structural and logical diagram of the read material** |  |  |  | 10 |  |  |
| 5 | **MT 1** |  |  |  | 100 |  |  |
| 6 | **L.6** The structure of the study. Observation technique. | LО 1 | ID 1.5. | 1 |  |  | offline |
| 6 | **PT6** Essence, structure and functions of cognition | LО 3 | ID 3.1.  ID 3.2. | 1 | 9 | Analysis | offline |
| 7 | **L.7** Regression analysis. Planning  Regression experiments. | LО 1 | ID 1.5. | 1 |  |  | offline |
| 7 | **PT 7** Metrological support  experimental research. | LО 3 | ID 3.1.  ID 3.2. | 1 | 9 | Analysis | offline |
| 8 | **L.8**. Classification, types and objectives of the experiment. | LО 2 | ID 2.1.  ID 2.2.  ID 2.3. | 1 |  |  | offline |
| 8 | **PT 8** Computational experiment. Graphic methods processing the results of the experiment. | LО 2 | ID 2.1.  ID 2.2.  ID 2.3. | 1 | 9 | Analysis | offline |
| 8 | **IWSP 3 Consultation on the implementation of IWS3** |  |  | 1 |  |  | offline |
| 8 | **IWS 3** Test | LО 1 | ID 1.6. |  | 20 | Logic task |  |
| 9 | **L.9** Correlation and regression analyzes. Dispersion (factorial) and covariance  analyzes. | LО 1 | ID 1.1. | 1 |  |  | offline |
| 9 | **PT 9** One-way experiment. Complete factorial experiment. | LО 3 | ID 3.1.  ИД 3.2 | 1 | 9 | Analysis | offline |
| 10 | **L.10** Experiment design with independent quantitative factors. | LО 3 | ID 3.1.  ИД 3.2 | 1 |  |  | offline |
| 10 | **PT 10** Planning experiment with qualitative factors. | LО 3 | ID 3.1.  ИД 3.2 | 1 | 9 | Analysis | offline |
| 10 | **IWSP 4 Consultation on the implementation of IWS4** |  |  | 1 |  |  | offline |
| 10 | **IWS 4** Topic 1. Regression analysis. Planning regression experiments. | LО 3 | ID 3.1.  ИД 3.2  ID 3.3.  ИД 3.4 |  | 25 | Logic task |  |
| 10 | **IWSP 5** Control work |  |  |  | 10 | Problem task |  |
| 10 | **МТ (Midterm Exam)** |  |  |  | 100 |  |  |
| 11 | **L.11** Basic concepts of mathematical planning of an experiment. Factors. Criteria optimality. | LО 2 | ID 2.1.  ID 2.2.  ID 2.3. | 1 |  |  | offline |
| 11 | **PT 11** Truth and scientificness. | LО 3 | ID 3.1.  ID 3.2. | 1 | 9 | Analysis | offline |
| 12 | **L.12** Functions and significance of science. | LО 3 | ID 3.3. | 1 |  |  | offline |
| 12 | **PT 12** Criteria for distinguishing between scientific, non-scientific and anti-scientific cognitive views | LО 3 | ID 3.1.  ID 3.2. | 1 | 9 | Analysis | offline |
| 12 | **IWSP 6 Consultation on the implementation of IWS 5** |  |  | 1 |  |  | offline |
| 12 | **IWS 5 L.9** Correlation analyzes. Regression analyzes. Dispersion (factorial) analyzes. Covariance analyzes. | LО 3 | ID 3.3. |  | 20 | Problem task |  |
| 13 | **L.13** Types of scientific hypotheses. | LО 3 | ID 3.4. | 1 |  |  | offline |
| 13 | **PT 13** Basic procedures the formation of the goal and objectives of scientific research. | LО 3 | ID 3.4. | 1 | 9 | Analysis | offline |
| 14 | **L.14** Experiment as a method of scientific research. | LО 4 | ID 4.1.  ID 4.2.  ID 4.3. | 1 |  |  | offline |
| 14 | **PT 14** Diagnostics in scientific research. | LО 4. | ID 4.1.  ID 4.2.  ID 4.3. | 1 | 9 | Analysis | offline |
| 15 | **L.15** System analysis in scientific research: main types and stages. | LО 5 | ID 5.1.  ID 5.2.  ID 5.3. | 1 |  |  | offline |
|  | **PT 15** Features of the application of methods of scientific literature, archival data. | LО 5 | ID 5.1.  ID 5.2.  ID 5.3. | 1 | 9 | Analysis | offline |
|  | **IWSP 7 Consultation on the implementation of IWS6** |  |  | 1 |  |  | offline |
|  | **IWS 6** Control work | LО 5 | ID 5.1.  ID 5.2.  ID 5.3. |  | 25 | Analysis |  |
|  | **Test** |  |  |  | 10 |  |  |
|  | **MT 2** |  |  |  | 100 |  |  |

**Dean Zayadan B.K.**

**Chairman of the Faculty Methodical Bureau** **Nazarbekova S. T.**

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