**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 (IWD)** | **ee** | | | | | **Number of credits** | **Independent work of student with teacher (IWDT)** |
| **Lectures (L)** | **Practical training (PT)** | | **Laboratory (Lab)** | |
| **MNI 7202** | **Research methodology** | 56 | 15 | 15 | | 0 | | 3 | 4 |
| **Academic course information** | | | | | | | | | |
| **Form of education** | **Type of course** | **Types of lectures** | | | **Types of practical training** | | **Number of IWD** | | **Form of final control** |
| Offline  3rd floor, room 322 | Theoretical | problematic,  analytical lecture | | | solving problems,  situational tasks | | 4 | | Exam  Writing / “Univer”. |
| 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. | 1. Assess achievements of fundamental sciences on which modern biotechnology is based in accordance with the specialty and specialization. | 1.1 Explain the relationship of modern biotechnology with other disciplines; Summarize the achievements of modern biotechnology.  1.2 Master the procedure for setting up an optimal experiment and processing measurement results |
| 2. Use advanced technologies in professional activities and systematize the results of scientific research by processing literary data. Explain the principle of modern methods of biotechnology. | 2.1 Apply the progressive biotechnology within the professional activity in the specialty of biotechnology;  2.2 Master the methodological foundations of scientific knowledge and creativity in practice. |
| 3. Improve qualifications in the professional field of biotechnology; in scientific and pedagogical work by the specialty. | 3.1 Apply the acquired knowledge in the professional field of biotechnology;  3.2 Use the acquired knowledge and skills in scientific and pedagogical work by the specialty. |
| 4. Summarize the information obtained from literary sources on biotechnology and related sciences. | 4.1 Analyze the information obtained from literary sources;  4.2 Master the modern information on the biotechnology and related sciences. |
| 5. Plan and manage projects; be able to find and make decisions among different opinions. | 5.1 Compose the projects and manage of them;  5.2 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** | 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.  4. Шкляр, Михаил Филиппович. Основы научных исследований. - Москва : Издательско-торговая корпорация "Дашков и К", 2018. - 208 с.  5. Shanti Bhushan Mishra and Shashi Alok Handbook of research methodology. – India 2017. – 28 p.  6. В. А. Бакулев, Н. П. Бельская, В. С. Берсенева Основы научного исследования. - Екатеринбург : Изд-во Урал. ун-та, 2014. – 64 c.  **Internet resources:**  1) <http://elibrary.kaznu.kz/ru>  2)<https://www.researchgate.net/publication/319207471_HANDBOOK_OF_RESEARCH_METHODOLOGY>  3) https://www.goodreads.com/  4) https://www.coursera.org/  5) https://www.edx.org/  6) <https://ed.ted.com/>  7) <https://elar.urfu.ru/bitstream/10995/28683/1/978-5-7996-1118-7_2014.pdf> | |

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| **Academic policy of the course in the context of university moral and ethical values** | **Academic Behavior Rules:**  Compulsory attendance in the classroom, the impermissibility of late attendance. Without advance notice of absence and undue tardiness to the teacher is estimated at 0 points.  Submission of assignments (Independent work of students, midterm control, laboratory tasks, projects and etc.) prior to the deadlines. The violation of submission deadlines leads to the deduction of penalty points.  **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)  Students with disabilities may receive advice via e-mail aigul\_amir@mail.ru |
| **Evaluation and attestation policy** | **Criteria-based evaluation:** assessment of learning outcomes in correlation with descriptors (verification of competence formation during midterm control and examinations).  **Summative evaluation:** evaluation of the presence and activity of the work in the classroom; assessment of the assignment, independent work of students, (project / case study / program) |
| **Assessment and attestation policy** | Weekly description of lecture topics, practical / seminar / laboratory / project work , assignments for independent work of students; an indication of the topic scope and grading scheme, including an assessment of the control task.  Summary and analysis of the curriculum content after the first half of the semester (midterm control 1) in the form of a scientific essay / system-oriented analysis of scientific issues of studied topics / presentation of individual case studies / evaluation of personal contribution to the development of a group project assignment, and others.  The final grade for the discipline is calculated according to the following formula:    **(IE1+MT+IE2/3) x 0.6+ (FEx0.4)**  Below are the minimum percentages: |

**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 |  | Overview Lecture | offline |
| **PT 1** Science as a system of knowledge | LО 1 | ID 1.1. | 1 | 10 | Analysis | offline |
| 2 | **L.2** Scientific Research Methods | LО 1 | ID 1.1.  ID 1.2. | 1 |  | Overview Lecture | offline |
| **PT 2** Research methods. Definitions. | LО 1 | ID 1.1. | 1 | 10 | Analysis | offline |
| 3 | **L.3** Theoretical research work | LО 1 | ID 1.1. | 1 |  | Overview lecture | offline |
| **PT 3** Empirical and theoretical levels  scientific knowledge | LО 1 | ID 1.1. | 1 | 10 | Presentation | offline |
| **Module П** Direction and stages scientific research work | | | | | | | |
| 4 | **L.4** Experimental research work. | LО 1 | ID 1.2. | 1 |  | Overview lecture | offline |
| **PT 4** Organization  research process | LО 1 | ID 1.1. | 1 | 10 | Analysis  Discussion | offline |
| 5 | **L.5** Direction and stages scientific  research. | LО 1 | ID 1.2. | 1 |  | Presentation | offline |
| **PT 5** Theoretical research methods (induction,  concretization, analogy, comparison, classification, analysis, synthesis). | LО 2 | ID 2.1.  ID 2.2. | 1 | 10 | Analysis | offline |
| **IWDP 1 Consultation on the implementation of IWD 1** |  |  | 1 |  | Logic task | MS Teams |
| **IWD 1 Test** | LО 1 | ID 1.2. |  | 25 | Test | MS Teams |
| **Make a structural and logical diagram of the read material** |  |  |  | 25 | Logic task | MS Teams |
| **MT 1** |  |  |  | 100 |  |  |
| 6 | **L.6** The structure of the study. Observation technique. | LО 1 | ID 1.2. | 1 |  | Presentation | offline |
| **PT6** Essence, structure and functions of cognition | LО 3 | ID 3.1.  ID 3.2. | 1 | 10 | Analysis  Discussion | offline |
| 7 | **L.7** Regression analysis. Planning  Regression experiments. | LО 1  LО 3 | ID 1.2  ID 3.1.  ID 3.2. | 1 |  | Presentation | offline |
| **PT 7** Metrological support  experimental research. | LО 3 | ID 3.1.  ID 3.2. | 1 | 10 | Analysis  Discussion | offline |
| 8 | **L.8**. Classification, types and objectives of the experiment. | LО 2 | ID 2.1.  ID 2.2. | 1 |  | Presentation | offline |
| **PT 8** Computational experiment. Graphic methods processing the results of the experiment. | LО 2 | ID 2.1.  ID 2.2. | 1 | 10 | Analysis | offline |
| **IWDP 2 Consultation on the implementation of IWD 2** |  |  | 1 |  | Logic task | offline |
| **IWD 2** Test | LО 1 | ID 1.2 |  | 10 | Test | MS Teams |
| 9 | **L.9** Correlation and regression analyzes. Dispersion (factorial) and covariance  analyzes. | LО 1  LО 3 | ID 1.1  ID 3.1. | 1 |  | Presentation  Discussion | offline |
| **PT 9** One-way experiment. Complete factorial experiment. | LО 3 | ID 3.1.  ИД 3.2 | 1 | 10 | Analysis | offline |
| 10 | **L.10** Experiment design with independent quantitative factors. | LО 3 | ID 3.1  ИД 3.2 | 1 |  | Presentation | offline |
| **PT 10** Planning experiment with qualitative factors. | LО 3 | ID 3.1  ИД 3.2 | 1 | 10 | Analysis  Discussion | offline |
| **IWDP 3 Consultation on the implementation of IWS 3** |  |  | 1 |  | Logic task | MS Teams |
| **IWD 4** Correlation analyzes and regression analyzes. | LО 3 | ID 3.1.  ID 3.2 |  | 20 | Presentation | MS Teams |
| **IWDP 3** Control work | LО 3 | ID 3.1.  ID 3.2. |  | 20 | Problem task | MS Teams |
| **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. | 1 |  | Problem task | offline |
| **PT 11** Truth and scientificness. | LО 3 | ID 3.1.  ID 3.2. | 1 | 10 | Analysis | offline |
| 12 | **L.12** Functions and significance of science. | LО 3 | ID 3.3. | 1 |  | Overview lecture | offline |
| **PT 12** Criteria for distinguishing between scientific, non-scientific and anti-scientific cognitive views | LО 3 | ID 3.1.  ID 3.2. | 1 | 10 | Analysis | offline |
| 13 | **L.13** Types of scientific hypotheses. | LО 3 | ID 3.2. | 1 |  | Overview lecture | offline |
| **PT 13** Basic procedures the formation of the goal and objectives of scientific research. | LО 3 | ID 3.2. | 1 | 10 | Analysis | offline |
| 14 | **L.14** Experiment as a method of scientific research. | LО 4 | ID 4.1.  ID 4.2. | 1 |  | Presentation | offline |
| **PT 14** Diagnostics in scientific research. | LО 4. | ID 4.1.  ID 4.2. | 1 | 10 | Analysis | offline |
| 15 | **L.15** System analysis in scientific research: main types and stages. | LО 5 | ID 5.1.  ID 5.2. | 1 |  | Presentation | offline |
| **PT 15** Features of the application of methods of scientific literature, archival data. | LО 5 | ID 5.1.  ID 5.2. | 1 | 10 | Analysis | offline |
| **IWDP 4 Consultation on the implementation of IWDP 4** |  |  | 1 |  | Logic task | MS Teams |
| **IWDP 4** Control work | LО 3 | ID 3.1.  ID 3.2. |  | 25 | Test | MS Teams |
| **Test** |  |  |  | 25 | Analysis | MS Teams |
| **MT 2** |  |  |  | 100 |  |  |

**Dean Zayadan B.K.**

**Chairman of the Faculty Methodical Bureau** **Asrandina S.Sh.**

**Head of the Department** **Zhunusbayeva Zh.K.**

**Lecturer** **Amirova A.K.**