

Ministry of Education and Science of Ukraine  
V. N. Karazin Kharkiv National University

Educational Scientific Program

(Educational Professional / Educational Scientific)

**BIOLOGY**

(Program's name)

Third (PhD) level of higher education

(the first (bachelors`), the second (masters`), the third (PhD))

Academic field 09 Biology

Specialty 091 Biology and Biochemistry

Specialization \_\_\_\_\_

APPROVED

by the Academic Council

of the V.N. Karazin Kharkiv National University

« 01 » May 2023,  
protocol № 8

Entered into force by order of

« 04 » May 2023 № 0119-1/197

Vice-rector for scientific and pedagogical work



Oleksandr HOLOVKO

Kharkiv, 2023

**LETTER OF AGREEMENT**  
**educational scientific program BIOLOGY**  
**of the third (PhD) level of higher education**

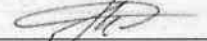
1. Scientific and Methodological Council of V. N. Karazin Kharkiv National University  
protocol № 7 out of 19 April 2023.

Chairman of the Scientific and Methodological Council of the University,  
Vice-Rector for Educational and Methodological Work  (Oleksandr HOLOVKO)

2. Academic Council of the School of Biology:  
protocol № 3 out of «22» March 2023.

Chairman of the Academic Council  (Yurii GAMULYA)

3. Scientific and Methodological Commission of the School of Biology:  
protocol № 6 out of «21» March 2023.

Chairman of the Scientific and Methodical Commission  (Olha TAHLINA)

4. Department of Biochemistry:  
protocol № 4 out of «09» March 2023.

Head of the Department  (Kristina SIEDOVA)

5. Department of Botany and Plant Ecology:  
protocol № 3 out of «21» March 2023.

Head of the Department  (Alla HROMAKOVA)

6. Department of Genetics and Cytology:  
protocol № 10 out of «20» March 2023.

Head of the Department,  
Guarantor of the educational program  (Liubov ATRAMENTOVA)

7. Department of Zoology and Animal Ecology:  
protocol № 9 out of «20» March 2023.

Head of the Department  (Tetiana ATEMASOVA)

8. Department of Molecular Biology and Biotechnology:  
protocol № 6 out of «22» March 2023.

Head of the Department  (Anatolii BOZHKOVA)



9. Department of Mycology and Phytoimmunology:  
protocol № 7 out of «28» February 2023.

Head of the Department

(Oleksandr AKULOV)

10. Department of Human and Animal Physiology:  
protocol № 8 out of «15» March 2023.

Head of the Department

(Tetiana BONDARENKO)

11. Department of Physiology and Biochemistry of Plants and Microorganisms:  
protocol № 7 out of «26» December 2022.

Head of the Department

(Andrii SCHOGOLEV)

12. Department of Theories of Culture and Philosophy of Science  
protocol № 6 out of «07» March 2023

Head of the Department

(Dmytrii PETRENKO)

13. Department of Professional Foreign Languages  
protocol № 8 out of «17» March 2023

Head of the Department

(Hanna HUSIEVA)

## PREFACE

### Developed by a working group consisting of:

Name	Job title, position	Scientific degree, academic title
The head of the working group, the guarantor of the educational program		
Liubov ATRAMENTOVA	School of Biology, Head of the Genetics and Cytology Department	Doctor of Biological Sciences Professor
Members of the working group		
Serhii UTIEVSKYI	School of Biology, Professor of the Zoology and Animal Ecology Department	Doctor of Biological Sciences, Professor
Volodymyr STRASHNIUK	School of Biology, Professor of the Genetics and Cytology Department	Doctor of Biological Sciences, Senior Researcher
Dmytro SHABANOV	School of Biology, Professor of the Zoology and Animal Ecology Department	Doctor of Biological Sciences, Professor

### The following are involved in designing the educational program:

Representatives of applicants for higher education:

Anna FEDOROVA	Student at the Program (the 4-th year of education)	
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Employers' representatives:

Nataliia BAHATSKA	Employer, head of the laboratory of medical genetics of the Research Institute of Child and Adolescent Health of the National Academy of Medical Sciences of Ukraine	Doctor of Biological Sciences, Professor
Nataliia MAZNYK	Employer, head of the laboratory of radiation cytogenetics of the State University "Institute of Medical Radiology and Oncology named after S.P. Grigoriev National Academy of Sciences of Ukraine"	Doctor of Biological Sciences, Senior Researcher

### The project development takes into account:

- 1) Temporary standard of higher education at the third (educational and scientific) level of higher education in specialty 091 "Biology and Biochemistry"
- 2) National qualifications framework, approved by CMU Resolution No. 1341 of November 23, 2011 "On approval of the National Qualification Framework" (as amended in accordance with CMU Resolutions No. 509 dated 06/12/2019; No. 519 dated 06/25/2020).
- 3) the Law of Ukraine "On Higher Education",
- 4) the Law of Ukraine "On scientific and scientific and technical activities", the resolution of the CMU "On approval of the Procedure for the training of higher education applicants for the degree of Doctor of Philosophy and Doctor of Sciences".



**1. The profile of the Educational Program BIOLOGY**  
**specialty 091 Biology and Biochemistry**

<b>1 – General information</b>	
<b>Higher Education Institution and Structural Unit</b>	V. N. Karazin Kharkiv National University, School of Biology
<b>Official name of the Educational Program</b>	Biology
<b>Higher Education Level</b>	Third (PhD) level of Higher Education
<b>Qualification</b>	Doctor of Philosophy in Biology and Biochemistry
<b>Type of Diploma and Curriculum volume</b>	PhD diploma, single, 40 ECTS credits, period of study - 4 years
<b>Accreditation</b>	Accredited by National Agency for Higher Education Quality, Certificate № 755, actual to 01.07.2026.
<b>Eligibility Criteria</b>	Specialist`s / Master`s degree. Applicants should have a legal education document. Selection is carried out on a competitive basis according to the University`s admission rules.
<b>Language(s) of teaching</b>	Ukrainian, English
<b>Period of validity of the Program</b>	4 years
<b>Internet address of permanent hosting of curriculum description</b>	<a href="http://biology.karazin.ua/study-PhD-ukr.html">http://biology.karazin.ua/study-PhD-ukr.html</a>
<b>2 – The goals of the Educational Program</b>	
In-depth specialized fundamental and practical training of doctors of philosophy in biology and biochemistry, specializing in the fields of scientific dissertation research and related sciences. Training of specialists capable of solving complex specialized tasks and practical problems in the field of biology, biochemistry and related sciences, independently determining the directions of scientific research, managing scientific teams, independently teaching biological disciplines in institutions of higher education, managing the scientific work of students of higher education.	
<b>3 - Description of the Educational Program</b>	
<b>Subject area (academic field, specialty, specialization)</b>	Academic field 09 – Biology Specialty 091 – Biology and Biochemistry
<b>Orientation of Educational Program</b>	Educational and Scientific
<b>Focus of Educational Program and specialization</b>	Advanced special education in the field of biology, specialty 091 "Biology and biochemistry" Object of activity: structure, functions and life processes of biological systems of different levels of organization, regularities of the dynamics of onto- and phylogeny and successional dynamics; biodiversity and evolution of living systems, their interaction with the environment, reactions under different conditions of existence; the importance of living beings in the biosphere, national economy, health care. Learning goals: acquiring the ability to solve complex problems of biology in the process of conducting research and innovation activities, which involves a deep rethinking of existing and creating new holistic knowledge and/or professional practice. Theoretical content of the subject area: fundamental and applied research works, analysis, design, innovative approaches to solving complex problems in the field of biology; structure, functions and life

	<p>processes, systematics, research methods of biological systems at different levels of organization.</p> <p>Tools and equipment: equipment, equipment, valid Internet resources and software necessary for laboratory, chamber and remote studies of the structure and properties of biological systems at various levels of organization.</p> <p>Keywords: biology, scientific work, teaching activity.</p>
<b>Distinctive features of Educational Program</b>	<p>The program includes disciplines of cycles of fundamental and professional-practical training that have an integrative nature, teaching practice, elective disciplines from current areas of scientific research in various fields of biology. It is carried out in an active research environment, involves research practice during all four years of study with the implementation of experimental research on the chosen topic, which in general provides a comprehensive preparation of graduates for further successful employment in the field.</p>
<b>4 – Employability and further education</b>	
<b>Employability</b>	<p>According to the National Classifier of Ukraine: Classifier of Professions (DK 003:2010):</p> <ul style="list-style-type: none"> <li>2 Professionals</li> <li>22 Life Sciences and Medical Sciences Professionals</li> <li>221 Life Sciences and Medical Sciences Professionals</li> <li>2211 Biologists, botanists, zoologists and related professionals</li> <li>2211.1 Scientific employees (biology, botany, zoology, etc.)</li> <li>2211.2 Biologists, botanists, zoologists and professionals in related professions</li> <li>2212 Professionals in the field of pathology, toxicology, pharmacology, physiology and epidemiology</li> <li>2212.1 Research staff (pathology, toxicology, pharmacology, physiology, epidemiology)</li> <li>2212.2 Pathologists, toxicologists, pharmacologists, physiologists and epidemiologists (Code ZKPPTR 20278 Biochemist)</li> <li>23 teachers</li> <li>231 Teachers of universities and higher educational institutions</li> <li>2310 Teachers of universities and higher educational institutions</li> <li>2310.2 Other teachers of universities and higher educational institutions</li> </ul> <p>According to the International Standard Classification of Occupations 2008 (ISCO-08):</p> <ul style="list-style-type: none"> <li>213 Life science professionals</li> <li>2131 Biologists, botanists, zoologists and related professionals</li> <li>2132 Farming, forestry and fisheries advisers</li> <li>2133 Environmental protection professionals</li> </ul> <p>Professional activity in the field of biology, agriculture, medicine, biotechnology, nature protection and rational nature management. Researcher, teacher of a higher educational institution.</p>
<b>Further education</b>	<p>Graduates are able to continue their studies at the scientific level of higher education and acquire additional qualifications in other specialties in the postgraduate education system.</p> <p>After obtaining the scientific degree of Doctor of Philosophy, one can apply for the degree of Doctor of Sciences, participate in postdoctoral programs.</p>
<b>5 – Teaching and assessment</b>	
<b>Teaching and learning</b>	<p>Principles: student-centered learning, problem- and project-oriented</p>

	<p>learning, initiative self-study.</p> <p>Forms of education: lectures, practical classes, seminar classes, research work, teaching practice.</p> <p>Teaching methods: lectures are problem-based, use analysis, synthesis, comparison, modeling, analogy, dialectics, abstraction, concretization, systemic, historical and logical approaches.</p> <p>Practical classes are individual and involve the use of methods of experimental scientific research, statistical analysis of the obtained data, information and communication technologies.</p> <p>The research work is independent and involves the realization of a dissertation study. Emphasis is placed on personal self-development, which will contribute to the formation of the need and readiness to continue self-education throughout life.</p>
<b>Assessment</b>	<p>Current control: surveys, testing, oral presentations, presentations at scientific seminars, calculation tasks.</p> <p>Final control: written and oral exams and assessments, a report on teaching practice.</p> <p>Final certification: dissertation defense.</p> <p>Evaluation of educational achievements of graduate students is carried out on a four-level (excellent, good, satisfactory, unsatisfactory) or two-level national scale (passed/failed); 100-point system, minimum passing score is 50.</p>
<b>6 – Program Competences</b>	
<b>Integral competence</b>	The ability to produce new ideas, solve complex problems in the field of biology in the process of carrying out professional and/or research and innovation activities, apply the methodology of scientific and pedagogical activities, as well as conduct own scientific research, the results of which have scientific novelty, theoretical and practical significance.
<b>General competences (GC)</b>	<p><i>- competencies defined by the temporary standard of higher education of the relevant level in the specialty:</i></p> <p>GC 01. Knowledge and understanding of the subject area and understanding of professional activity.</p> <p>GC 02. Ability to plan and manage time.</p> <p>GC 03 Ability to learn and master modern knowledge.</p> <p>GC 04. Ability to motivate people and move forward.</p> <p>GC 05. The ability to evaluate and ensure the quality of the work performed.</p> <p>GC 06. Ability to work autonomously.</p> <p>GC 07. Ability to perform safe activities.</p> <p><i>- additional general competencies determined by the institution of higher education for the educational program:</i></p> <p>GC 08. Ability to work independently, learn new information, acquire new skills and abilities throughout life.</p>
<b>Professional competences of specialty (PC)</b>	<p><i>- competencies defined by the temporary standard of higher education of the relevant level in the specialty:</i></p> <p>PC 01. The ability to plan and carry out complex original research, to achieve scientific results that create new knowledge in biology and related interdisciplinary areas and can be published in scientific publications in biology and related fields.</p> <p>PC 02. The ability to present and discuss orally and in writing the results of scientific research and/or innovative developments in Ukrainian and English, to understand English-language scientific texts according to the direction of research.</p> <p>PC 03. Ability to use modern information technologies, databases and</p>



	<p>other electronic resources, specialized software in scientific and educational activities.</p> <p><b>PC 04.</b> The ability to carry out scientific and pedagogical activities in institutions of higher education, in scientific structures/institutions using modern methodologies, methods and tools of pedagogical and biological sciences.</p> <p><b>PC 05.</b> The ability to identify, formulate and solve problems of a research nature in the field of biology, to evaluate and ensure the quality of research conducted.</p> <p><b>PC 06.</b> Ability to initiate, develop and implement complex innovative projects in biology and related interdisciplinary projects.</p> <p><b>PC 07.</b> The ability to adhere to research ethics, as well as the rules of academic integrity in scientific research and scientific-pedagogical activities.</p> <p><b>PC 08.</b> The ability to form a systematic scientific worldview and a general cultural outlook.</p> <p><b>- additional professional competences determined by the institution of higher education for the educational program:</b></p> <p><b>PC 09.</b> The ability to apply modern biological concepts regarding the structure and functions of living things at different levels of organization, mechanisms of integration and regulation of life processes of living organisms, the structure of biological systems at different levels of organization, including molecular and cellular, in professional activities and when interpreting one's own research.</p> <p><b>PC 10.</b> The ability to generate and experimentally test one's own hypotheses regarding the connection between biological structure and function, molecular mechanisms of biological processes and phenomena, cause-and-effect relationships in nature.</p> <p><b>PC 11.</b> Skills of reasoned discussion and communication in the field of biological sciences and at the border of subject areas using specialized scientific terminology</p> <p><b>PC 12.</b> The ability to explain narrowly professional issues to specialists in other fields, to provide practical consultations in the field of biological sciences, to defend a scientific worldview.</p>
	<p><b>7 – Program Learning Outcomes (LO)</b></p>
<p><b>Learning outcomes (LO)</b></p>	<p><b>- study results determined by the temporary standard of higher education of the corresponding level in the specialty:</b></p> <p><b>LO 01.</b> Demonstrates conceptual and methodological knowledge in biology and at the adjacent areas.</p> <p><b>LO 02.</b> Applies research skills sufficient to conduct scientific and applied research at the level of world achievements in the relevant field, to obtain new knowledge and/or implement innovations.</p> <p><b>LO 03.</b> Presents and discusses the results of research, scientific and applied problems of biology in national and foreign languages, competently reflects the results of research in scientific publications in scientific publications.</p> <p><b>LO 04.</b> Formulates and tests hypotheses; uses appropriate evidence to substantiate the conclusions, in particular, the results of the analysis of literature sources, experimental research (surveys, observations, experiments) and mathematical and/or computer modeling.</p> <p><b>LO 05.</b> Develops and researches conceptual, mathematical and computer models of processes and systems, effectively uses them to obtain new knowledge and/or create innovative products in biology and related interdisciplinary areas.</p>

- LO 06. Plans and carries out experimental and/or theoretical research in biology and related interdisciplinary areas using modern tools.
- LO 07. Analyses the results of one's own research and compares them with the results of other researchers in the context of the entire complex of modern knowledge regarding the investigated problem.
- LO 08. Applies modern tools and technologies for searching, processing and analyzing information, in particular, statistical methods for analyzing data of a large volume and/or complex structure, specialized databases and information systems.
- LO 09. Develops and implements scientific and/or innovative projects that provide an opportunity to rethink the existing and create new integral knowledge and/or professional practice.
- LO 10. Solves important theoretical and practical problems of biology in compliance with the norms of academic ethics and taking into account social, economic, ecological and legal aspects (making proposals for financing research and/or projects, registration of intellectual property rights).
- LO 11. Formulates general principles and chooses methods of biological sciences, as well as the methodology of scientific research, apply them in own research in the field of biology and in teaching practice.
- LO 12. Demonstrates knowledge of the principles of the organization of the educational process in a higher education institution, formulates the content, learning goals, ways to achieve them, chooses forms of control, prepare texts of educational and methodological content for the preparation of students of higher education, specialty 091 Biology and biochemistry.
- LO 13. Uses in practice various forms of professional qualification improvement, adaptations to changes in professional activity.
- LO 14. Forms a systematic scientific outlook, demonstrates a general cultural outlook, bears responsibility for personal professional development.
- additional learning outcomes determined for the educational program by the institution of higher education:**
- LO 15. Knows modern methodological approaches to determining the characteristics of living systems at different levels of organization, to molecular diagnostics of the state of biological systems, including taking into account medical and ecological aspects.
- LO 16. Knows the methodology of modeling objects and processes in living organisms and their components using mathematical methods and information technologies.
- LO 17. Knows the methodology of information search and data analysis.
- LO 18. Applies pedagogical technologies at a level sufficient for the implementation of developed programs of educational disciplines by specialization in higher educational institutions.
- LO 19. Understands the basic principles of the functioning of the international scientific community and the organization of international cooperation in the field.
- LO 20. Is able to conduct a scientific discussion and communicate on professional topics, including ones on the border of subject areas, using specialized scientific terminology, is able to provide practical consultations in the field of biology and related sciences.

## 8 – Resource supply of Program realization

<b>Staff</b>	Highly qualified specialists are involved in the implementation of the program, including 10 doctors of science, professors and three candidates of science, associate professors. In order to improve one's professional level, each lecturer undergoes internships, including abroad ones. All specialists are heads of scientific fields, authors of textbooks, monographs, papers in highly rated periodicals.
<b>Material and technical support</b>	<p>The use of available material resources in teaching ensures that students acquire the competencies and learning outcomes defined by the Program:</p> <ul style="list-style-type: none"><li>- laboratories with modern research equipment</li></ul> <p>Learning and research laboratories of the School of Biology are equipped with modern equipment for performing high-tech methods of biological research in the field of molecular biology, molecular genetics, cytogenetics, and biochemistry; cultivation of animal and plant cells; spectrophotometric, luminescent and fluorescent analysis; electrophoretic fractioning of proteins and nucleic acids; liquid chromatography; micromanipulation with cells and microinjections; phase-contrast and fluorescence confocal microscopy of fixed samples and living cells; automatic optical cytometry and flow fluorescence cytometry; polymerase chain reaction and analysis of gene expression on DNA microarrays, namely:</p> <ul style="list-style-type: none"><li>- computer and multimedia equipment:</li></ul> <p>classrooms and laboratories with multimedia equipment (projectors and plasma panels) with Internet access; computer classes for general use;</p> <ul style="list-style-type: none"><li>- collections of living and fixed biological objects:</li></ul> <p>For the educational process and research work, the following are used:</p> <ul style="list-style-type: none"><li>- herbarium of Botany and Plant Ecology Department (National Heritage)</li><li>- collection of Drosophila stocks of Genetics and Cytology (National Heritage) Department</li><li>- vivarium of the KhNU with laboratory rats</li><li>- research areas and laboratories of the biological station.</li></ul> <p>Research tasks are carried out in the laboratories of the Departments of the School of Biology and the Research Institute of Biology, as well as in specialized laboratories of partner institutions (under the terms of agreements on mutual cooperation in the educational and scientific sphere): Institute of Problems of Cryobiology and Cryomedicine of the National Academy of Sciences of Ukraine, Institute of Scintillation Materials of the National Academy of Sciences of Ukraine, Institute of Medical Radiology of the National Academy of Sciences of Ukraine, Institute of Neurology, Psychiatry and Narcology of the National Academy of Sciences of Ukraine, Institute of Endocrine Pathology Problems, Research Institute of Health Care of Children and Adolescents. Research can be carried out within the framework of joint research works (on the terms of agreements) with the Kharkiv National Medical University of the Ministry of Health of Ukraine, the Dnipro Medical Academy of the Ministry of Health of Ukraine, the Institute of Molecular Biology and Genetics of the National Academy of Sciences of Ukraine, the Institute of Biochemistry of the National Academy of Sciences of Ukraine, etc. This allows to use the material and technical support of other institutions in the educational process</p>

	<p>and to bring the conditions of the educational process closer to the future working conditions of graduate students in accordance with their professional orientation.</p> <p>- Center for language certification and a number of international centers:</p> <p>The teachers of the School of Biology have international certificates confirming their knowledge of the English language at the B2 level, as well as certificates of advanced training courses in the field of "Ukrainian language - professional applications", and constantly work on improving information and digital competence. Other elements of material and technical support create a comfortable environment in which the learning process takes place. Students are provided with dormitories. Karazin Students Hall, the first co-working space in Ukraine for independent study and recreation of students, is functioning; sports halls, playgrounds and various sports sections, cultural and exhibition centers. Food outlets offer a high-quality menu, including certificates for certain religious and cultural groups. University buildings are equipped with ramps and convenient elevators.</p>
<b>Information, teaching and methodological support</b>	<p>Official website of V.N. Karazin KhNU: <a href="https://karazin.ua/">https://karazin.ua/</a>  School of Biology website: <a href="http://biology.karazin.ua/">http://biology.karazin.ua/</a>  Central Scientific Library: <a href="http://www-library.univer.kharkov.ua/">http://www-library.univer.kharkov.ua/</a>  Electronic archive of V.N.Karazin KhNU:  <a href="http://dspace.univer.kharkov.ua/?locale=uk">http://dspace.univer.kharkov.ua/?locale=uk</a></p> <p>Applicants are provided with wireless Internet access points; unlimited access to the Internet; open resources of the scientific library, it is possible to get a corporate mail address. The website of the School of Biology contains information about the educational process (standards of education, educational and professional programs, educational and work plans; schedules of the educational process; links to educational and methodological materials of disciplines; educational and working programs of disciplines, internship programs, criteria for evaluating the level of training). Training courses are supported remotely in the university's e-learning center, which provides the Moodle virtual learning environment, or in Google Classrooms. Remote support provides applicants with the necessary didactic materials for independent and individual work; methodical instructions for completing individual tasks, questions for tests and exams.</p>
<b>9 – Academic mobility</b>	
<b>National Credit Mobility</b>	Applicants of the third level of higher education can realize one`s right to participate academic mobility in higher educational institutions and scientific institutions of Ukraine or abroad under agreements and on their own initiative based on an individual invitation.
<b>International Credit Mobility</b>	The following programs are available: Erasmus Mundus, the DAAD German Academic Exchange Program, the Fulbright Scholarship Program, the Open Society Institute (Washington), etc., as well as individual invitations from higher education and research institutions abroad.
<b>Teaching foreign applicants</b>	Education of foreign citizens is realized on a paid basis (under contract) at the expense of individuals and legal entities. All other conditions are regulated by the University Admission Rules and in accordance with current legislation.

## 2. Components of the Educational Program (EP)

### 2.1. The list of components of the EP

Code	Components of the EP (Educational disciplines, course projects (work), practice courses, qualification work)	ECTS credits	Final assessment
1	2	3	4
<b>Obligatory components of EP</b>			
<b>General training</b>			
OC 1.	Philosophical principles and methodology of scientific research	5	Credit
OC 2.	Foreign language for PhD students	6	Credit, Exam
OC 3.	Teaching biological disciplines in institutions of higher education	4	Credit
<b>Professional training</b>			
OC 4.	Modern methodology of biological research	5	Credit
OC 5.	Preparation of publications and presentation of the results of scientific research	5	Credit
OC 6.	Teaching Practice course	5	Credit
<b>Total amount of obligatory components:</b>		<b>30</b>	
<b>Elective components of EP</b>			
<b>General training (Elective disciplines of general scientific training (choose one of the 2 specified from the faculty catalog; total volume 5 credits))</b>			
EC 1.1	Multivariate statistics	5	Credit
EC 1.2	Analysis of floristic and ecological data by means of statistics in the R program	5	Credit
<b>Professional training (one of the 14 specified from the faculty catalog is chosen; total volume of 5 credits)</b>			
EC 2.1	Systems of plant growth and development regulation	5	Exam
EC 2.2	Modern aspects of bio- and nanotechnologies	5	Exam
EC 2.3	Modern aspects of phytopathology	5	Exam
EC 2.4	Modern aspects of mycology	5	Exam
EC 2.5	Anthropogenic transformation of flora	5	Exam
EC 2.6	Integrative physiology	5	Exam
EC 2.7	Molecular phylogeny and phytogeography	5	Exam
EC 2.8	Genetics of the object of research	5	Exam
EC 2.9	Basics of arachnology	5	Exam
EC 2.10	Simulation modeling of dynamics and stability of supraorganism biosystems	5	Exam
EC 2.11	Research methodology in modern biochemistry	5	Exam
EC 2.12	Physiology and biochemistry of algae	5	Exam
EC 2.13	Philosophy of biology	5	Exam
EC 2.14	Fundraising in scientific research	5	Exam
<b>The total amount of elective components:</b>		<b>10</b>	
<b>Curriculum volume:</b>		<b>40</b>	

## 2.2. The scientific component of the Educational Scientific Program

The scientific component of the educational-scientific program involves conducting one's own scientific research under the guidance of one scientific supervisor - an employee of V.N. Karazin Kharkiv National University. If the research is conducted on the basis of another scientific research institution in accordance with the agreement on scientific cooperation, then a second manager is appointed - an employee of this institution. The scientific supervisor can be a specialist with a doctor of science degree or a candidate of science (doctor of philosophy).

The results of the research are performed in the form of a dissertation in accordance with Order of the Ministry of Education and Culture No. 40 "On approval of requirements for the preparation of a dissertation" with a volume of 120 - 160 pages.

The scientific component of the educational-scientific program contains a list of types of scientific work of a graduate student and forms of control (reporting).

The scientific component of the educational and scientific program is performed in the form of an individual plan of scientific work of a graduate student that is an integral part of the curriculum of the educational and scientific program.

<i>Year</i>	<i>Content of the graduate student's scientific work (type of work)</i>	<i>Reporting form, form of control</i>
1-st	Writing the research protocol. Development of a research scheme. Mastering the methods of obtaining scientific facts. Mastering methods of statistical data analysis Study of scientific literature on the topic of the dissertation. Carrying out scientific research.	Processing and statistical analysis of fact material Report at the department meeting and at the meeting the Academic Council of the School of Biology. Fixation of work results in an individual plan.
2-d	Study of scientific literature on the topic of the dissertation. Carrying out scientific research. Processing and statistical analysis of actual material. Writing the methodological section of the dissertation.	Report at the meeting of the department and at the meeting of Academic Council of the School of Biology. Fixation of work results in an individual plan.
3-d	Study of scientific literature on the topic of the dissertation. Carrying out scientific research. Processing and statistical analysis of actual material. Writing the thesis section "Review and analysis of scientific literature".	Report at the meeting of the department and at the meeting of Academic Council of the School of Biology. Fixation of work results in an individual plan. Preparation of publications on the research topic.
4-th	Final analysis of factual material, formulation of conclusions. Final design of the dissertation text according to the rules. Writing a report, developing a presentation.	Report at the meeting of the department and at the meeting of Academic Council of the School of Biology. Fixation of work results in an individual plan Dissertation report at a scientific seminar.

### 3. Structural and logical diagram of Educational Scientific Program

<b>1 semester</b>
Philosophical principles and methodology of scientific research Foreign Language
<b>2 semester</b>
Modern methodology of biological research Teaching biological disciplines in institutions of higher education Foreign Language
<b>3rd semester</b>
Preparation of publications and presentation of the results of scientific research Multivariate statistics/Analysis of floristic and ecological data by means of statistics in the R program
<b>4th semester</b>
Discipline of specialization by choice Teaching practice

### 4. Form of certification of graduates

**Form of certification of applicants education in the specialty 091 "Biology and biochemistry" of the educational program "Biology"**

Certification of candidates for the educational level of Doctor of Philosophy is carried out in the form of a public defense of a dissertation. A mandatory condition for admission to the defense is the applicant's successful completion of his/her individual study plan.

**Requirements for the qualification thesis**

The dissertation for obtaining the degree of Doctor of Philosophy is an independent comprehensive study that offers a solution to an actual scientific problem in the field of biology or adjacent, the results of which constitute an original contribution to the total amount of biological knowledge and are published in relevant publications.

The dissertation should not contain academic plagiarism, falsification, fabrication.

The dissertation must be represented on the website of the institution of higher education (scientific institution).

The dissertation must meet the requirements of the Order of the Ministry of Education and Culture No. 40 "On approval of requirements for the preparation of a dissertation". The maximum volume of the main text of the dissertation should constitute 160 pages, the minimum - 120.

## 5. Correspondence matrix between EP competences and components

	OC 1	OC 2	OC 3	OC 4	OC 5	OC 6
GC 01	+	+		+	+	+
GC 02	+	+	+	+	+	+
GC 03	+	+		+	+	+
GC 04	+	+	+	+	+	+
GC 05	+	+		+	+	+
GC 06	+	+		+	+	+
GC 07	+	+		+	+	+
GC 08	+	+		+	+	+
PC01	+			+		
PC02		+		+		+
PC03				+		
PC04			+			+
PC05	+			+		
PC06				+	+	
PC07	+	+	+	+	+	+
PC08	+					
PC09				+	+	
PC10				+		
PC11			+			+
PC12			+	+	+	+



## 6. Matrix of implementation of EP learning outcomes (LO) by corresponding components

	OC 1	OC 2	OC 3	OC 4	OC 5	OC 6
LO01			+	+	+	+
LO02				+	+	+
LO03		+		+	+	+
LO04	+	+		+	+	+
LO05				+	+	
LO06				+		
LO07					+	
LO08				+	+	
LO09	+	+		+	+	
LO10	+	+		+	+	+
LO11	+			+		
LO12			+			+
LO13	+			+	+	+
LO14	+	+	+	+	+	+
LO15		+		+	+	
LO16				+		
LO17	+			+	+	+
LO18			+			+
LO19		+		+	+	
LO20			+	+	+	