MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY

EDUCATIONAL-SCIENTIFIC PROGRAM
"ECOLOGY"

third (educational and scientific) level of higher education

Area of specialization 101 "Ecology" field of knowledge 10 "Natural Sciences"

Qualification: Philosophy Doctor degree (PhD)

"APPROVED" by
Academic Council of Sumy NAU
"10" 26.04 2021
(Minutes №)
Chairman of the Academic Council
Rector
academician of NAAS of Ukraine _____ **V.I.Ladyka**
Educational - scientific program implemented since
"___" _____2021

Rector
academician of NAAS of Ukraine _____ **V.I.Ladyka**
(order № 238-к "02 06 2021p.)

Sumy 2021

LIST OF AGREEMENT

Educational - Scientific Program in Specialty

"ECOLOGY"

area of specialization 101 "Ecology"

third (educational and scientific) *level of higher education*

Project group consists of:		
Project group leader:		
Doctor of Biological Sciences, Professor, Dean of the Faculty of Agrotechnology and Natural Resource Management	(Підпис)	**I.M. Kovalenko**
Project group members:		
Doctor of Biological Sciences, Professor, Head of the Department of Ecology and Botany	(Підпис)	**V. G. Skliar**
Candidate of Biological Sciences, Associate Professor, Associate Professor of Ecology and Botany Department	(Підпис)	**G.O. Klymenko**
Candidate of Biological Sciences, Associate Professor, Associate Professor of Ecology and Botany Department	(Підпис)	**K.S.Kyrylchuk**
Applicant for higher education, PhD student of Ecology and Botany Department	(Підпис)	**N.P. Yaroshenko**

Vice-Rector for Academic Activity , Candidate of Economic Sciences, Professor — Valerii Mykolaiovych Zmailov

Head of the Higher Education Quality, Licensing and Accreditation Department, Candidate of Economic Sciences, Associate Professor — Iryna Dmytrivna Skliar

PREFACE

The Educational - Scientific Program (ESP) for the preparation of applicants for higher education of the third (educational and scientific) level in the specialty 101 "Ecology" contains the amount of ECTS credits required to obtain the appropriate degree of higher education: list of competencies, program learning outcomes; forms of certification of applicants.

ESP training of third level higher education is developed in accordance with the Law of Ukraine "On Higher Education" dated July 1, 2014, "On Approval of the National Qualifications Framework" dated December 30, 2015 № 1187, "On Approval of Licensing Conditions for Educational Activities of Educational Establishments" dated December 20, 2015.

The Educational - Scientific Program of specialization 101 "Ecology" **was developed by a working (project) group consisting of:**

№ п/п	Full Name	Position	Scientific degree, academic title (if available)
1	Kovalenko Igor Mykolayovych	Dean of the Faculty of Agrotechnology and Natural Resource Management	Doctor of Biological Sciences, Professor,
2	Skliar Victoria Grygorivna	Head of the Department of Ecology and Botany	Doctor of Biological Sciences, Professor,
3	Klymenko Ganna Olexandrivna	Associate Professor of Ecology and Botany Department	Candidate of Biological Sciences, Associate Professor
4	Kyrylchuk Kateryna Serhiivna	Associate Professor of Ecology and Botany Department	Candidate of Biological Sciences, Associate Professor
5	Yaroshenko Natalia Pavlivna	PhD student of Ecology and Botany Department	

The Educational - Scientific Program viewed at the Ecology and Botany Department meeting (minutes № 14 dated March 22, 2021); Academic Council of the Faculty of Agrotechnology and Natural Resource Management (minutes № 10 dated April 16, 2021).

Stakeholder reviews:

Likholat Yu.V. – Doctor of Biological Sciences, Head of Plant Physiology and Introduction Department, Oles Gonchar Dnipro National University.

Kubrakov S.V. – Director of the National Nature Park "Desnyansko-Starogutsky"
Yaroshenko N.P. – PhD student of Ecology and Botany Department

I. Profile of educational - scientific program in specialty 101 "Ecology"

1– General information	
Full name of higher educational establishment and structural subdivision	SUMY NATIONAL AGRARIAN UNIVERSITY
Level of higher education	third (educational and scientific) level
Degree of higher education	Philosophy Doctor degree
Field of knowledge	10 – Natural Sciences
Specialization	101 – Ecology
Official name of the academic program	"Ecology"
Educational qualification	PhD in Natural Sciences
Diploma qualification	Degree of higher education – Philosophy Doctor degree (PhD) Specialty – 101 "Ecology" Academic program "Ecology"
Type of diploma and educational program scope	unitary, 60 ECTS credits, (educational component ESP), program length -4 years
Restrictions as for forms of studying	None
Accreditation availability	Not accredited
Cycle / Program level	8 level of the National Qualifications Framework, FQ-EHEA – 3 cycle, EQF LLL – 8 level
Prerequisites	Applicants have higher education of the second (master's) level (educational qualification level of a specialist). Requirements for applicants are determined by the Admission Rules for the PhD educational and scientific program
Language of instruction	Ukrainian, English
Length of the educational program	until 2025 (initiated in 2021).
Link of the permanent placement of the description	https://science.snau.edu.ua/aspirantura/
2 – The Educational - Scientific program aim	
The aim of the academic program is to form the applicants' ability to dynamically combine knowledge, skills, communication skills and abilities in solving complex problems in the field of professional and / or research and innovation activities in the specialty 101 "Ecology", which implies a deep rethinking of holistic knowledge and / or professional practice in the implementation of continuous self-development and self-improvement.	
3 – Characteristics of The Educational - Scientific program	
Subject area (field of knowledge, specialty, specialization (if available))	Field of knowledge 10 "Natural Sciences" Area of specialization 101 "Ecology"
Orientation of the academic	Educational and scientific.

program	ESP has an academic orientation. The program is aimed at developing research and teaching competencies and communication skills among applicants. The educational and scientific program includes an educational and scientific component. *The educational component of the program* is 60 ECTS credits, among them 45 ECTS credits are compulsory disciplines in all cycles and 15 ECTS credits of a discipline are optional. *The scientific component of the program* provides for the implementation of own scientific research under the guidance of a scientific advisor / supervisors with the registration of the results obtained through a dissertation. This component of the program is not measured by ECTS credits, but is drawn up separately by means of an individual plan for the scientific work of a PhD student.
Object of study	Structure and functional components of ecosystems of different levels and origins; anthropogenic impact on the environment and optimization of nature management.
Learning aims	To deepen theoretical knowledge and practical skills in the field of Natural Sciences in the specialty "Ecology", to develop philosophical and linguistic competencies, to acquire the ability to produce new ideas, solve complex problems in the field of ecology and carry out their own scientific research.
Theoretical content	Concepts, principles of modern ecology and their use for environmental protection, sustainable use of nature and sustainable development.
Methods, techniques	Methods of collecting, processing and interpreting the results of ecological research, methods of computer modeling, physical, chemical and biological methods of studying the structure and properties of ecological systems.
Tools and equipment	Equipment, hardware and software required for field, laboratory and remote sensing studies of the structure and properties of ecological systems of different levels and origins.
The main focus of the program	Special education in the field of 10 "Natural Sciences", area of specialization 101 "Ecology". Key words: ecology, environmental protection, complex population analysis, anthropogenic impact, monitoring, balanced nature management, nature protection measures, greening of the agrosphere
Features of the program	The ESP training model provides for professional

	training focused on the development of the applicant's competencies in accordance with the topic of his dissertation and research areas carried out by university scientists in combination with general training, which provides for the development of teamwork skills, academic writing, teaching competencies. At the same time, professional training is implemented mainly in the optional component of the ESP, and general training is mainly implemented in the compalsory component of the program. This model allows the applicant to develop social skills, as well as combine their scientific research with the study of EC professional training. Professional training is aimed at the formation of conceptual and methodological knowledge and skills in the specialty "Ecology", with the priority of studying the features and patterns of the functioning of phytodiversity at the population level of the organization of living matter, as well as the development and implementation of measures for the greening of agricultural spheres based on the results of a comprehensive population analysis. ensuring optimal environmental management.
4 – Graduates' eligibility to employment and further education	
Employment eligibility	Graduates have ample opportunities for career development depending on their personal interests, in particular: scientific, teaching, expert, managerial, administrative activities in the field of "Natural Sciences" in the specialty 101 "Ecology". The level of training allows you to develop a professional career based on strategic thinking and deep knowledge in the field of Natural Sciences. The specialist is able to perform the specified professional work (according to the "Classifier of professions DK 003: 2010"): 1221 heads of production units in agriculture, forestry and water management, fish farming, fishing and nature reserve; 1237 heads of research subdivisions and subdivisions for scientific and technical preparation of production and other heads; 2213 professionals in agronomy, water management, zooengineering, forestry, land reclamation and nature reserve; 2310 teachers of universities and higher educational institutions; and other areas of activity in the specialty.
Further studying	Training for development and self-improvement in

	scientific and professional spheres of activity in the specialty 101 “Ecology”, as well as other related fields of scientific knowledge: training at the 10th (scientific) level of the NQF of Ukraine in the field of 10 “Natural Sciences”; educational programs, research grants and scholarships (including abroad) that contain additional educational components. Various forms of lifelong learning (both in Ukraine and abroad) to improve skills and improve management and administrative, scientific, research, teaching or other activities.
5 – Teaching and assessment	
Approaches to teaching and studying	Approaches to teaching and learning: - active learning (interactive teaching methods that provide a personality-oriented approach and development of systematic, creative and strategic thinking; joint learning in interdisciplinary groups, “inverted class” - learning by teaching (pedagogical practice); - training through research (including participation in the implementation of budgetary and economic contract research work, participation in research projects); - Personalized Learning: individual consultations with supervisors; elective professional disciplines.
Assessment system	***Educational component of the program.*** The system for assessing the obtained learning outcomes in the disciplines of the educational and scientific program consists of current and final control. The current control of knowledge is carried out both orally and in writing (according to the assessment system presented in the discipline’s syllabus). Final control of knowledge is carried out through written and oral examinations, tests. During the current and final control in the process of assessing the disciplines that provide professional training, the scientific articles prepared by the applicant and published in the collections of professional publications and / or publications included in the international scientometric bases are taken into account. ***Scientific component of the program.*** The evaluation of the scientific activity of applicants is carried out in accordance with the scientific plan of the graduate student through: - participation in department seminars, conferences; - reviewing of scientific works; - self-esteem; - recommendations of the supervisor;

	- intermediate attestations of a graduate student in the form of an annual report on the implementation of an individual plan; - Preparation and presentation of dissertation work.
Monitoring form of PhD student (applicant) learning achievements	***Educational component of the program.*** The final assessment of the educational components, the control of the applicant's training success is carried out in the form of: - exam is based on the results of studying the compulsory components of the educational program of the cycle of general scientific training, the cycle of research training, the cycle of language training, as well as the cycle of special (vocational) training; - midterm assessment is carried out according to the results of the study of all other educational components provided by the curriculum. ***Scientific component of the program.*** The scientific component of ESP involves the current attestation of PhD students at a meeting of the department twice a year. The purpose of the midterm assessment is to assess the level of implementation of the individual plan, to provide the applicant with support and feedback. The purpose of the final certification is to establish compliance of the level of educational and scientific training of graduate students with the requirements of the educational and scientific program of the Doctor of Philosophy in the specialty 101 "Ecology" and ends with the public defense of the dissertation. The defense of the dissertation is carried out publicly at a meeting of the dissertation council. Compulsory condition for admission to the defense of the dissertation, subject to the successful implementation of an individual scientific plan, is the approbation of research results and main conclusions at scientific conferences and their publication in professional journals, according to current requirements.
6 – Program competencies	
Integral competence	Ability to produce new ideas, solve complex problems in the field of ecology, which involves a deep rethinking of existing and creation of new holistic knowledge and / or professional practice, apply modern methodologies of scientific and scientific-pedagogical activities, conduct their own research, the results of which have scientific novelty , theoretical and practical significance.
General competencies (GC)	GC01. Ability to abstract thinking, analysis and

	synthesis. GC02. Ability to communicate in a state language both orally and in writing. GC03. Ability to communicate in a foreign language. GC04. Ability to conduct research at the appropriate level. GC05. Ability to search, process and analyze information from various sources. GC06. Ability to identify, pose and solve problems. GC07. Ability to work in an international context. GC08. Ability to work autonomously. GC09. Ability to develop and manage projects
Special (vocarional, subject) competencies SC)	SC10. Ability to master concepts, theoretical and practical problems, history of development and current state of scientific knowledge in the field of ecology, environmental protection and optimization of nature. SC11. Ability to form a systematic scientific worldview of modern science, professional ethics and general cultural worldview. SC12. Ability to present the results of their own scientific and scientific and technical activities, including through scientific publications. SC13. Ability to convey to students modern knowledge and scientific results of their own research, including in the framework of scientific and pedagogical activities in the field of natural sciences. SC14. Ability to intellectual creative activity aimed at obtaining new knowledge and (or) finding ways to apply them in the field of ecology, environmental protection and optimization of nature. SC15. Ability to assess the degree and nature of the negative impact of agriculture and other types of anthropopression on the environment and human. SC16. Ability to study and assess the state of populations as a real form of existence of species and one of the basic levels for ensuring the functioning of ecosystems and conservation of biodiversity.
Program learning outcomes **Upon completion of the educational program, the applicant will be able to:**	
PLOs01. Demonstrate in-depth knowledge of the advanced conceptual and methodological foundations of natural sciences, which allows for rethinking and deepening environmental science. PLOs02. Demonstrate mastery of general scientific concepts of modern science. PLOs03. Plan and implement in practice an original independent scientific research characterized by novelty, theoretical and practical value and contributing to the solution of significant problems of ecology, environmental protection and balanced nature management. PLOs04. Formulate, research and solve problems of ecology, environmental protection and balanced use of natural resources using the scientific method of cognition.	

PLOs05. Independently develop innovative complex scientific projects in the field of ecology, environmental protection and optimization of nature management. PLOs06. Apply methods of mathematical and geoinformation analysis and modeling of the current state and forecasting changes in ecosystems and their components. PLOs07. Independently use modern equipment for scientific research in the field of ecology, environmental protection and balanced nature management. PLOs08. Communicate, including in a foreign language, in an interactive mode with the wide scientific community, students and the public in the field of ecology, environmental protection and optimization of nature management. PLOs09. Communicate clearly and unequivocally professional knowledge, the results of one's own scientific research, rationale and conclusions, both orally and in writing, to different audiences, both nationally and internationally. PLOs10. Apply modern technologies (including information technologies) in scientific and scientific-pedagogical and environmental-educational activities. PLOs11. Reveal leadership qualities, responsibility and complete autonomy in the implementation of complex scientific projects. PLOs12. Implement the intellectual property right to the results of scientific and technical activities within the framework of scientific ethics. PLOs13. Be able to carry out a comprehensive analysis of populations and develop measures to ensure their protection and rational, non-exhausting use. PLOs14. Be able to assess the degree and nature of the negative impact of agricultural production and other types of anthropopression on human, biodiversity, the environment, assess risks and propose measures to green the agrosphere.	
7 – Forms of certification of higher education applicants	
Forms of certification of higher education applicants	The form of attestation of the educational component is the fulfillment by the applicant of the academic program curriculum in full. The form of attestation of the scientific component is public defense of the dissertation for the obtaining the Philosophy Doctor degree.
Requirements to the qualification work	The dissertation for the obtaining the Philosophy Doctor degree is an independent detailed research that offers a solution to theoretical and / or practical actual environmental problems, the results of which represent an original contribution to the sum of knowledge in the field of modern ecology, environmental protection and balanced nature management and is characterized by scientific novelty and practical value. The main results of the dissertation study must be tested, published in accordance with the requirements in force for the defense of dissertations, and also checked for academic plagiarism. The thesis should not contain academic plagiarism, falsification, fabrication. The dissertation work should be posted on the website of the higher education (scientific establishent).
Public defense requirements	Requirements for the procedure and special conditions for conducting public defense are determined by the Cabinet of Ministers of Ukraine.

	The defense of the dissertation takes place in public at a meeting of the specialized Academic Council. Mandatory prerequisite for admission to the defense of the dissertation is the approbation of the research results and main conclusions at scientific conferences and their publication in professional scientific journals, in accordance with current requirements.
8 – Resource support for program implementation	
Staffing	The scientific and pedagogical staff meets the requirements of the current legislation of Ukraine. Scientific and pedagogical staff involved in the implementation of the educational program is employees of the Sumy NAU, they are provided with advanced training and internships at least once every five years. 100% of scientific and pedagogical staff involved in teaching disciplines have scientific degrees and academic titles. The personnel potential of Sumy NAU allows training applicants for the third level of higher education in specialty 101 “Ecology” and meets the regulatory requirements.
Logistics	Logistics of Sumy NAU Faculty of Agrotechnology and Natural Resource Management allows training of third-level higher education and meets regulatory requirements, the university has the equipment, facilities and software needed for field, laboratory and remote studies of the structure and properties of ecological systems of different levels and origins. AP peculiarities are the possibility of conducting laboratory research on the basis of powerful laboratories of the university: “Educational and scientific PCR laboratory”" within the Erasmus + KA2 project, “Electron microscopy”, “Laboratory of ecological agriculture and nature management”, and on the basis of nature reserves, subordinate to SNAU. Long-term experience of effective cooperation with environmental institutions, enshrined in cooperation agreements, also allows using their territory and material and technical base for the training of third-level higher education applicants in the specialty “Ecology”.
Informative and methodical support	The educational process of higher education seekers training is provided with methodological and informational materials in a sufficient amount in relation to regulatory needs. In addition, informational and educational support for all participants in the educational process is carried out through the university website (https://snau.edu.ua/), which

	contains information about educational programs, educational, scientific and educational activities, departments, contacts, repository, scientific libraries and reading rooms, etc. All resources of the library of Sumy NAU are available through the university website and the library website (https://library.snau.edu.ua/), ordinary and electronic reading rooms of the SNAU library are provided with wireless Internet access. Applicants have free access to the repository of Sumy NAU (http://repo.snau.edu.ua/) and the use of the fund of scientific libraries of higher education institutions of Sumy, the V.I. Vernadsky National Library of Ukraine and others. In accordance with the order of the Ministry of Education and Science of № 1213 dated 06.11.2018 "On Granting Access to Higher Education Establishments and Research Institutions under the Ministry of Education and Science to Electronic Scientific Databases", Sumy National Agrarian University was granted access to international scientometric databases Scopus and Web of Science.
9 – Academic mobility	
National credit mobility	Based on bilateral agreements between Sumy NAU and universities of Ukraine. Agreements on academic mobility for teaching and research in universities and research institutions of Ukraine are concluded. Leading specialists of universities and research institutions of Ukraine may be involved in the management of scientific work of applicants for higher education on the terms of individual agreements.
International credit mobility	On the basis of bilateral agreements between Sumy NAU and higher educational institutions of foreign partner countries on the terms of cooperation agreements. Detailed information is presented on the website of Sumy National Agrarian University: https://snau.edu.ua/mizhnarodni-proekti/
Training of foreign applicants for higher education	The training of applicants for the third level of higher education is carried out on general terms with additional language training. Sumy NAU has the right to train applicants for higher education with the ability to prepare foreigners and stateless persons. Training of applicants for the third (educational and scientific) level of higher education is carried out on general conditions with additional language training, scientific and pedagogical staff has B2 certificates.

2. 1. List of educational – scientific program components and their logical sequence

2.1. List of ESP components

Code	Components of the academscl program (academic disciplines, course projects (works), practices, qualification work)	Number of credits	Form of final control
1	**2**	**3**	**4**
Compulsory components of ESP			
CC 1.	Philosophy of Science	4	exam
CC 2.	Modern Information Technologies in Scientific Activity	3	exam
CC 3.	Communications in the Scientific Environment	3	credit
CC 4.	Methodology of the Scientific Research	3	credit
CC 5.	The Plant in the Experiment	3	exam
CC 6.	Modeling and Planning of a Scientific Experiment	3	credit
CC 7.	Registration of Intellectual Property Rights	3	credit
CC 8.	Organization and Training Methods	3	exam
CC 9.	Organization of Preparation of Scientific Publications and Thesis Writing	3	exam
CC 10.	Scientific Projects Management	3	exam
CC 11.	Foreign Language for Professional Purposes	4	credit, exam
CC 12.	Methods of Scientific Papers Preparation in a Foreign language	3	exam
CC 13.	Pedagogical Practice	4	credit
CC 14.	Ecological Planning and Ecological Projects	3	exam
Total		**45**	
Optional components of AP			
OC1	Vocational optional discipline 1*	5	exam
OC2	Vocational optional discipline 2*	5	exam
OC3	Vocational optional discipline 3*	5	exam
	Total	**15**	
	TOTAL VOLUME OF THE ESP	**60**	

List of professional elective disciplines: VC1-VC3

1. Forest Ecology
2. Bioindication and Biotesting
3. Plants Population ecology
4. Biosozology
5. Biometrics with the Basics of Modeling and Forecasting Population Processes
6. Modern Problems of Agroecology

2.2. Structural and logical scheme of ESP

Applicants for higher education have the right to choose disciplines within the limits provided by the relevant educational program and working curriculum, in the amount of not less than 25 percent of the total number of ECTS credits provided for this level of higher education.

Structural and logical scheme of PhD training

<table>
<tr><td colspan="2">General training unit (competencies)</td><td colspan="4">Block of vocational training (competence)</td></tr>
<tr><td rowspan="5">1 year</td><td>Philosophy of Science</td><td>Organization and Training Methods</td><td>Methodology of the Scientific Research</td><td colspan="2"></td><td>The Plant in the Experiment</td></tr>
<tr><td colspan="2" rowspan="3"></td><td></td><td colspan="2">Foreign Language for Professional Purposes</td></tr>
<tr><td>Registration of Intellectual Property Rights</td><td colspan="2"></td><td rowspan="2"></td></tr>
<tr><td colspan="2"></td><td>Organization of Preparation of Scientific Publications and Thesis Writing</td><td>Communications in the Scientific Environment</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td rowspan="6">2 year</td><td colspan="2" rowspan="3"></td><td>Modern Information Technologies in Scientific Activity</td><td colspan="2"></td><td></td></tr>
<tr><td colspan="3">Scientific Projects Management</td><td></td></tr>
<tr><td rowspan="2">Modeling and Planning of a Scientific Experiment</td><td colspan="2" rowspan="2">Methods of Scientific Papers Preparation in a Foreign language</td><td>OC. 1</td></tr>
<tr><td colspan="2"></td><td>OC. 2</td></tr>
<tr><td colspan="2"></td><td colspan="3">Ecological Planning and Ecological Projects</td><td>OC. 3</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>3 year</td><td></td><td>Pedagogical Practice</td><td colspan="3"></td></tr>
</table>

Note: ** *For foreign applicants preparation for third level of higher education, changes in the structural and logical scheme are possible in accordance with the agreements on the conditions of study at the third level of higher education in Sumy NAU for foreign citizens*:

3. The list of normative documents on which the project of the standard of the third (educational and scientific) level of higher education on a specialty 101 “Ecology” is based

- Law of Ukraine of 01.07.2014 № 1556-VII "On higher education" [availavle at: http://zakon4.rada.gov.ua/laws/show/1556-18];
- Law of Ukraine of November 26, 2015 № 848 — VIII “On scientific and scientific-technical activity [available at:http://zakon3.rada.gov.ua/laws/show/848-19];
- Resolution of the Cabinet of Ministers of Ukraine dated 29.04.2015 № 266 "On approval of the list of branches of knowledge and specialties in which the training of applicants for higher education" [available at: http://zakon4.rada.gov.ua/laws/show/ 266-2015-n];
- Resolution of the Cabinet of Ministers of Ukraine of 30.12.2015 № 1187 "On approval of the License conditions for educational activities of educational institutions" [available at: http://zakon4.rada.gov.ua/laws/show/1187-2015-p/ page]
- Resolution of the Cabinet of Ministers of Ukraine of 23.11.2011 № 1341 "On approval of the National Qualifications Framework" [available at: http://zakon4.rada.gov.ua/laws/show/1341-2011-p];
- Resolution of the Cabinet of Ministers of Ukraine dated 29.04.2015 № 266 "On approval of the list of branches of knowledge and specialties in which the training of applicants for higher education" [available at: http://zakon4.rada.gov.ua/laws/show/ 266-2015-n];
- Resolution of the Cabinet of Ministers of Ukraine of 30.12.2015 № 1187 "On approval of the License conditions for educational activities of educational institutions" [available at: http://zakon4.rada.gov.ua/laws/show/1187-2015-p/ page]
- Resolution of the Cabinet of Ministers of Ukraine of 23.11.2011 № 1341 "On approval of the National Qualifications Framework" [available at: http://zakon4.rada.gov.ua/laws/show/1341-2011-p];
- Resolution of the Cabinet of Ministers of Ukraine of March 23, 2016 № 261 "On approval of the Procedure for training applicants for higher education for the degree of Doctor of Philosophy and Doctor of Science in higher educational institutions (scientific institutions)" [available at: http: //zakon3.rada.gov. ua / laws / show / 261-2016-n];
- National Classifier of Ukraine: "Classification of economic activities" DK 009: 2010 [available at: http://www.ukrstat.gov.ua/];
- National Classifier of Ukraine: "Classifier of Professions" SC 003: 2010DC 003: 2010 [available at: http://www.dk003.com/];
- Methodical recommendations for the development of standards of higher education, approved by the order of the Ministry of Education and Science of Ukraine from 01.06.2017 № 600 (as amended by the order of the Ministry of Education and Science of Ukraine dated 21.12.2017 № 1648), approved by the higher education sector of the Scientific and Methodological Council of the Ministry of Education and Science of Ukraine (Minutes of 29.03.2016 №3) [available at: http://mon.gov.ua/activity/education/reforma-osviti/naukovo-metodichna-rada-ministerstva/metodichni-rekomendacziyi.html].

Project team leader (guarantor of the educational and scientific program):

Doctor of Biological Sciences, Professor **I.M. Kovalenko**

Appendix 1

Matrix of correspondence of the competences defined by ESP to NQF descriptors

Classification of competencies according to NQF	Knowledge	Skills	Communication	Autonomy and responsibility
General competencies				
GC01. Ability to abstract thinking, analysis and synthesis.	+	+		
GC02. Ability to communicate in the state language both orally and in writing.			+	
GC03. Ability to communicate in a foreign language.			+	
GC04. Ability to conduct research at the appropriate level.	+	+		
GC05. Ability to search, process and analyze information from various sources.		+		+
GC06. Ability to identify, pose and solve problems.		+		+
GC07. Ability to work in an international context.			+	+
GC08. Ability to work autonomously.		+	+	+
GC09. Ability to develop and manage projects.			+	+
Special (vocational) competencies				
SC10. Ability to master concepts, theoretical and practical problems, history of development and current state of scientific knowledge in the field of ecology, environmental protection and optimization of nature.	+	+		
SC11. Ability to form a systematic scientific worldview of modern science, professional ethics and general cultural worldview.	+	+		
SC12. Ability to present the results of their own scientific and scientific and technical activities, including through scientific publications.		+	+	+
SC13. Ability to convey to students modern knowledge and scientific results of their own research, including in the framework of scientific and pedagogical activities in the field of natural sciences.			+	+
SC14. Ability to intellectual creative activity aimed at obtaining new knowledge and (or) finding ways to apply them in the field of ecology, environmental protection and optimization of nature.		+		
SC15. Ability to assess the degree and nature of the negative impact of agriculture and other types of anthropopression on the environment and human.		+		+
SC16. Ability to study and assess the state of populations as a real form of species existence and one of the basic levels for ensuring the functioning of ecosystems and conservation of biodiversity.		+		+

Appendix 2

Matrix of respondency of determined educational-scientific program competencies to the outcomes of studying and competencies

Program learning outcomes	Competencies																
		General competencies									Special (vocational) competencies						
	Integral competence	GC 01	GC 02	GC 03	GC 04	GC 05	GC 06	GC 07	GC 08	GC 09	SC 10	SC 11	SC 12	SC 13	SC 14	SC 15	SC 16
PLOs01. Demonstrate in-depth knowledge of the advanced conceptual and methodological foundations of natural sciences, which allows for rethinking and deepening environmental science.	+	+													+		+
PLOs02. Demonstrate mastery of general scientific concepts of modern science.		+										+			+		
PLOs03. Plan and implement in practice an original independent scientific research characterized by novelty, theoretical and practical value and contributing to the solution of significant problems of ecology, environmental protection and balanced nature management.					+		+					+	+			+	+
PLOs04. Formulate, research and solve problems of ecology, environmental protection and balanced use of natural resources using the scientific method of cognition.	+		+				+				+						
PLOs05. Independently develop innovative complex scientific projects in the field of ecology, environmental protection and optimization of nature management.					+				+	+						+	+
PLOs06. Apply methods of mathematical and geoinformation analysis and modeling of the current state and forecasting changes in ecosystems and their components.		+			+	+											+
PLOs07. Independently use modern					+				+						+	+	+

equipment for scientific research in the field of ecology, environmental protection and balanced nature management.																	
PLOs08. Communicate, including in a foreign language, in an interactive mode with the wide scientific community, students and the public in the field of ecology, environmental protection and optimization of nature management.			+	+				+						+			
PLOs09. Communicate clearly and unequivocally professional knowledge, the results of one's own scientific research, rationale and conclusions, both orally and in writing, to different audiences, both nationally and internationally.				+				+					+				
PLOs10. Apply modern technologies (including information technologies) in scientific and scientific-pedagogical and environmental-educational activities.	+					+						+		+			
PLOs11. Reveal leadership qualities, responsibility and complete autonomy in the implementation of complex scientific projects.									+	+				+			
PLOs12. Implement the intellectual property right to the results of scientific and technical activities within the framework of scientific ethics.								+					+		+		
PLOs13. Be able to carry out a comprehensive analysis of populations and develop measures to ensure their protection and rational, non-exhausting use.		+			+	+	+				+	+	+		+		+
PLOs14. Be able to assess the degree and nature of the negative impact of agricultural production and other types of anthropopression on human, biodiversity, the environment, assess risks and propose measures to green the agrosphere.					+	+	+					+	+			+	

Program Learning Outcomes Matrix (PLOs) with the relevant components of the Academic Program

	PLOs 01	PLOs 02	PLOs 03	PLOs 04	PLOs 05	PLOs 06	PLOs 07	PLOs 08	PLOs 09	PLOs 10	PLOs 11	PLOs 12	PLOs 13	PLOs 14
CC 1		*		*	*									
CC 2						*				*				
CC 3								*	*		*			
CC 4	*					*	*							*
CC 5		*		*			*						*	*
CC 6	*	*				*	*							
CC 7	*										*	*		
CC 8								*	*	*				
CC 9			*						*	*				
CC 10				*	*			*			*		*	
CC 11		*						*	*					
CC 12			*	*				*	*					
CC 13	*	*		*			*	*	*					
CC 14			*		*							*		*