

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
"IGOR SIKORSKY KYIV POLYTECHNIC INSTITUTE"**

APPROVED

by Academic Council of
Igor Sikorsky Kyiv Polytechnic Institute

(protocol № ____ dated «____» _____ 20__ p.)

Head of the Academic Council

_____ Mykhailo ILCHENKO

ENVIRONMENTAL SAFETY

EDUCATIONAL AND PROFESSIONAL PROGRAM

first (Bachelor's) level of higher education

Program Subject Area	101 Environmental Studies
Field of Study	10 Natural Sciences
Qualification	Bachelor of Environmental Studies

Came into force in 2022/2023 study year
by the Order of Rector
of Igor Sikorsky Kyiv Polytechnic Institute
dated _____ 20__ № _____

PREAMBLE

DEVELOPED by the project team:

Project team leader:

Nosachova Yulia Viktorivna, PhD, Associate Professor, Associate Professor of the Department of Ecology and Plant Polymers Technology

Project team members:

Gomelya Mykola Dmytrovych, Doctor of Technical Sciences, Professor, Head of the Department of Ecology and Plant Polymers Technology

Shabliy Tetyana Oleksandrivna, Doctor of Technical Sciences, Professor, Professor of the Department of Ecology and Plant Polymers Technology

Rutkovskiy Eduard Kazymirovych, PhD, Head of the Board of PJSC KYIV PLANT "RIAP"

Manysheva Nadiya Yuriivna, student of the 2nd year of the group LE-01

AGREED:

Scientific and Methodological Council of Igor Sikorsky Kyiv Polytechnic Institute for program subject area 101 Environmental Studies

_____ Mykola GOMELYA

(protocol № 5 dated « 18 » 11 2021)

Methodological Council of Igor Sikorsky Kyiv Polytechnic Institute

Head of the Methodological Council

_____ Yuriy YAKYMENKO

(protocol № dated « » 20 .)

CONSIDERED:

According to the results of the review and public discussion of the EP, after receiving all the suggestions and proposals of stakeholders (<https://eco-paper.kpi.ua/navchannia/osvitni-prohramy.html>), the educational and professional program was discussed at a meeting of the Department of Ecology and Plant Polymers Technology (protocol № 5 dated 17.11.2021). The results of the discussion in the form of an extract from the department meeting were forwarded to NMCU 101 Environmental Studies.

In accordance with the order of the Ministry of Economy of Ukraine № 810-21 dated 25.10.2021 "On the approval of Amendment № 10 to the national classifier ДК 003:2010" the list of professions for graduates regarding employment has been changed in the program.

The list of educational components was also detailed.

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1. PROFILE OF THE EDUCATIONAL PROGRAM

1 – General information	
Full name of HEI and institute / faculty	National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Faculty of Chemical Engineering
Higher education level and title of qualification in the original language	HE Degree – Bachelor Educational qualification – Bachelor of Environmental Studies
The official name of the educational program	Environmental safety
Type of diploma and scope of educational program	Bachelor's diploma, single, 240 ECTS credits, training period 3 years and 10 months
Availability of accreditation	Certificate of accreditation of the Program Subject Area by the Ministry of Education and Science of Ukraine НД №1192540 in accordance with the decision of the Accreditation Commission dated 30.05.2013, protocol №104 Order of the Ministry of Education of Ukraine dated 04.06.2013 №2070-П, valid until July 1, 2023
Cycle / level of HE	NFQ of Ukraine - level 6 QF-EHEA - the first cycle EQF-LLL - level 6
Prerequisites	Complete general secondary education
Language (s) of instruction	Ukrainian
Term of the educational program	Until the next accreditation
Internet address of the permanent placement of the educational program	https://eco-paper.kpi.ua/ , section "Educational programs" https://osvita.kpi.ua/ section "Educational programs"
2 – The goal of the educational program	
<p>Training of specialists capable of solving complex specialized tasks, solving practical problems of developing new and improving existing systems of environmental conservation and environmental protection from negative anthropogenic influence, carrying out organizational activities; and, through a harmonious combination of fundamental knowledge and engineering tools with training in the humanitarian sphere, to successfully compete on the labor market in conditions of sustainable innovative scientific and technical development of society.</p> <p>Corresponds to the development strategy of Igor Sikorsky Kyiv Polytechnic Institute for 2020-2025 (https://data.kpi.ua/sites/default/files/files/2020-2025-strategy.pdf).</p>	

3 – Characteristics of the educational program	
Subject area	<p><i>Objects:</i> structure and functional components of ecosystems of different levels and origins; anthropogenic impact on the environment and optimization of nature management.</p> <p><i>Learning objectives are:</i> formation of a complex of knowledge, skills and abilities at applicants of higher education for the use in professional activities in the field of ecology, environmental protection and balanced nature management.</p> <p><i>Theoretical content of the subject area:</i> The concepts, principles of natural sciences, modern ecology and their use for environmental protection, balanced nature management and sustainable development.</p> <p><i>Methods, techniques and technologies:</i> The applicant must master the methods of collecting, processing and interpreting the results of environmental studies.</p> <p><i>Tools and equipment:</i> equipment and software necessary for field, laboratory and remote studies of the structure and properties of environmental systems of various levels and origins.</p>
Orientation of the EP	Educational and Professional
The main focus of the EP	<p>Special education in the field of natural sciences in Program Subject Area 101 Environmental Studies.</p> <p>Key words: sustainable development, natural resources, anthropogenic load, resource conservation, environmental protection, cleaner technologies.</p> <p>The program is based on well-known scientific provisions in the field of protection and conservation of the environment, taking into account the modern level of technology, and focuses on current environmental problems, within which further professional growth of applicants is possible in the field of monitoring the state of the environment, management of environmental protection activities, rational use of natural resources, management of resources in conditions of technogenesis, the development and improvement of technologies for the reduction of anthropogenic load on the environment.</p>
Features of the EP	<p>Interdisciplinary and multidisciplinary training of specialists in environmental studies. The program includes blocks of compulsory (general and vocational training cycles) educational components that ensure the formation of general and professional competencies of the program subject area, as well as a block of optional educational components (general and vocational training cycles) that enhance the competencies of the program subject area and are important for further professional training of applicants.</p> <p>The program provides for pre-diploma practice at companies and specialized institutions; participation of applicants for higher education in student scientific circles; the possibility of teaching individual special courses in a foreign language, international activities in the field of mobility and internships for students and teachers.</p>

4 – Qualification of graduates for employment and further studying	
Qualification for employment	<p>Graduates can work in primary positions in the professions defined by the National Classification of Ukraine: Classifier of professions DK 003: 2010.</p> <p>3211 – Environmental Technician 3212 – Nature Protection Inspector 3212 – Technician (Natural Sciences) 3439 – State Inspector of Technogenic and Environmental Supervision 3439 – Environmental Associate Professional 3449 – Inspector of the Protection of the Nature Reserve Fund 2211.2 Environmental Professional 2211.2 Environmental Expert 2213.2 Engineer of Reproduction of Natural Ecosystems 2213.2 Engineer of the Protection of Natural Ecosystems 2213.2 Nature Management Engineer 2149.2 Environmental Protection Engineer 2149.2 Technogenic and Environmental Safety Engineer</p>
Further training	The possibility of studying in the program of the second (master's) level of higher education. Acquisition of additional qualifications in the postgraduate education system.
5 – Teaching and evaluation	
Teaching and learning	<p>Student-centered learning through lectures, seminars, practical classes; personal differentiated and problem-oriented learning through laboratory and pre-diploma practice, self-study through consultations with a teacher, individual classes.</p> <p>All participants of the educational process are provided with timely, accessible and understandable information about the goals, content and program results of training, the order and criteria of evaluation within individual educational components. Full preparation for professional activities is provided through participation in scientific and innovative projects with the publication of results in professional journals. Opportunities for approbation of research results are provided, in particular, due to the annual International Scientific and Practical Conferences "Ecology. Human. Society" and "Clean water. Fundamental, applied and industrial aspects".</p>
Evaluation	Current and semester control is carried out in accordance with the Rating system in the form of reports, presentations, tests and exams. Diploma project defense.
6 – Program competencies	
Integral competence	The ability to solve complex specialized tasks and solve practical problems in the field of ecology, environmental protection and balanced nature management, or in the learning process, which involves the application of fundamental theories and methods of environmental sciences, and are characterized by the complexity and uncertainty of conditions.
General competences	
C 01	Knowledge and understanding of the subject area and professional activity
C 02	Skills in using information and communication technologies
C 03	The ability to adapt and act in a new situation
C 04	The ability to communicate in the national language both orally and in writing
C 05	The ability to communicate in a foreign language

C 06	The ability to communicate with representatives of other professional groups at different levels (with experts from other fields of knowledge/types of economic activity)
C 07	The ability to act socially responsibly and consciously
C 08	The ability to conduct research at an appropriate level
C 09	The ability to work in a team
C 10	Interpersonal skills
C 11	The ability to evaluate and ensure the quality of the work performed
C 12	The ability to realize own rights and responsibilities as a member of society, to be aware of the values of civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen of Ukraine
C 13	The ability to preserve and multiply moral, cultural, scientific values and achievements of society based on an understanding of the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, processes and technologies, to use various types and forms of activity for recreation and healthy lifestyle
Professional competencies of the specialty	
C 14	Knowledge and understanding of theoretical fundamentals of ecology, environmental protection and balanced nature management
C 15	The ability to critically understand basic theories, methods and principles of natural sciences
C 16	Understanding of the main theoretical provisions, concepts and principles of mathematical and socio-economic sciences
C 17	Knowledge of up-to-date achievements of national and international environmental legislation
C 18	The ability to assess the impact of technogenesis processes on the state of the environment and to identify environmental risks associated with production activities
C 19	The ability to use basic principles and components of environmental management
C 20	The ability to conduct environmental monitoring and assess the current state of the environment
C 21	The ability to justify the need and to develop measures aimed at preserving landscape and biological diversity and forming an ecological network
C 22	The ability to participate in the development of a management system and handling of production and consumption waste
C 23	The ability to use up-to-date information resources for environmental research
C 24	The ability to inform the public about the state of environmental safety and balanced nature management
C 25	The ability to master international and domestic experience in solving regional and cross-border environmental problems
C 26	The ability to participate in the management of environmental actions and/or environmental projects
C 27	The ability to develop project and working technical documentation in the field of environmental protection technologies, to compose structural schemes with elements of equipment and industrial buildings, to draw up completed design and construction developments
C 28	The ability to improve, design, implement and operate technologies and equipment for treatment and processing of raw gases, wastewater and solid waste
C 29	The ability to develop projects for calculating maximum permissible discharges and emissions, to monitor compliance with MPD, MPE

C 30	The ability to apply up-to-date methods and means of monitoring the state of atmospheric air, natural waters, soils and biota, to determine the level of contamination of natural and industrial materials with radioactive elements, to master methods for assessing the impact of adverse factors on living organisms, to determine the adaptive capabilities of the human body in environmental conditions
C 31	The ability to distinguish the technological processes of production, to determine the sources and ways of entering the natural environment of harmful components, to assess their impact on human health and the quality of the environment
7 – Program learning outcomes	
PO 01	To demonstrate an understanding of the basic principles of management of environmental actions and / or environmental projects
PO 02	To understand the basic environmental laws, rules and principles of environmental protection and nature management
PO 03	To understand the basic concepts, theoretical and practical problems in the field of natural sciences that are necessary for analysis and decision-making in the field of ecology, environmental protection and optimal use of nature
PO 04	To use the management principles on which the environmental safety system is based
PO 05	To know the conceptual basis of monitoring and regulation of anthropogenic load on the environment
PO 06	To identify the factors that determine the formation of landscape and biological diversity
PO 07	To solve problems in the field of environmental protection using generally accepted and / or standard approaches and international and national experience
PO 08	To be able to search for information using appropriate sources to make informed decisions
PO 09	To demonstrate skills in assessing unforeseen environmental problems and making informed choices of their solving
PO 10	To be able to use software, GIS-technologies and Internet resources for information support of environmental research
PO 11	To be able to predict the impact of technological processes and industries on the environment
PO 12	To participate in the development and implementation of projects aimed at optimal management and treatment of industrial and municipal waste
PO 13	To be able to form effective communication strategies in order to convey ideas, problems, solutions and personal experience in the field of ecology
PO 14	To be able to communicate the results of activities to a professional audience and the general public, to make presentations and messages
PO 15	To be able to explain the social, economic and political consequences of implementing environmental projects
PO 16	To choose the optimal strategy for holding public hearings on the problems and formation of the territories of the nature reserve fund and the ecological network
PO 17	To understand the responsibility for the effectiveness and consequences of comprehensive environmental measures
PO 18	To combine the skills of individual and team work to get results with an emphasis on professional integrity and responsibility for decision making
PO 19	To raise the professional level by continuing education and self-education
PO 20	To be able to form requests and determine actions that ensure compliance with the norms and requirements of environmental legislation
PO 21	To be able to choose the best methods and tools for research, data collection and processing
PO 22	To participate in the development of projects and practical recommendations for environmental protection
PO 23	To demonstrate skills in implementing environmental measures and projects

PO 24	To understand and realize their rights and responsibilities as a member of society, to realize the values of a free democratic society, the rule of law, human and civil rights and freedoms in Ukraine
PO 25	To preserve and increase the achievements and values of society based on understanding the place of the subject area in the general system of knowledge, to use different types and forms of physical activity to lead a healthy lifestyle
PO 26	To carry out laboratory researches with use of modern devices, to provide sufficient accuracy of measurement and reliability of results, to process the obtained results
PO 27	To apply methodologies and technologies of design and implementation of environmental technologies and equipment, to carry out design and engineering activities
PO 28	To determine the class of toxicity and hazard of chemical pollutants according to the parameters of toxicometry, to determine the impact of radiation on the environment, to calculate the maximum allowable discharges and maximum allowable emissions
PO 29	To carry out technological and hydraulic calculations of treatment facilities, to compile energy and material balance of devices, to perform parametric calculation of equipment, to choose standard constructions in construction, to compile master plans of industrial enterprises
PO 30	To assess the state of the environment, to determine the level of impact of the company (production) on the environment, to determine the main pollutants of the environment of the company (production)
PO 31	To develop technologies, to use processes and devices that ensure efficient separation, concentration, removal, destruction of harmful impurities in water systems and gas medium, processing and disposal of waste
8 – Resource support for program implementation	
Staffing	In accordance with the staffing requirements to support educational activities for the respective HE level, approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187 in the current edition: Involvement of professional practitioners and lecturers from other higher education institutions in teaching professional-oriented disciplines. Staffing complies with applicable license requirements.
Material-technical support	In accordance with the technological requirements for material-technical support of educational activities of the respective HE level, approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187 in the current edition: A specialized laboratory, a complex of laboratories of the department and the auditorium, equipped with technical means of demonstration, including multimedia systems, are available for research. There are agreements with companies, on the basis of which students will gain an experience in the field of solving environmental problems. There is an option of remote information exchange and interaction with teachers. Meets license requirements.
Information and educational-methodical support	In accordance with the technological requirements for training-methodological and informational support of education activities of the respective HE level, approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187 in the current edition: The use of the library at the department and the Scientific and Technical Library of Igor Sikorsky Kyiv Polytechnic Institute.

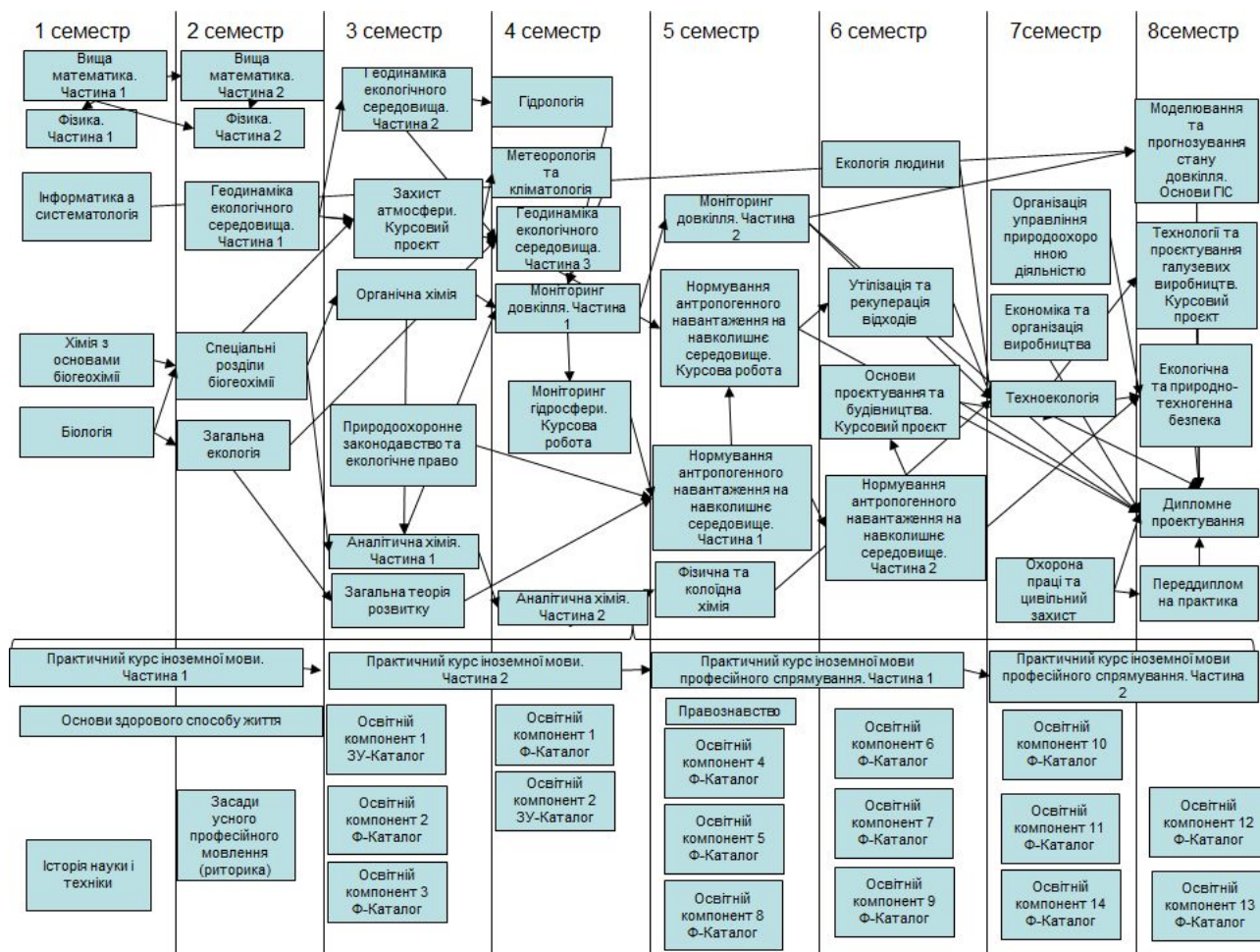
9 – Academic mobility	
National credit mobility	Possibility of making agreements on academic mobility in accordance with the current legislation of Ukraine in the field of the higher education.
International credit mobility	Erasmus+KA1 academic mobility program, participation in the university's academic mobility programs on a competitive basis.
Training of foreign HE applicants	Education is conducted in English in separate academic groups, while Ukrainian is studied as a foreign language; or in Ukrainian in joint groups with Ukrainian applicants.

2. LIST OF COMPONENTS OF THE EDUCATIONAL PROGRAM

Code	Components of the educational program (disciplines, course projects (works), practice, qualifying work)	ECTS Credits	Final examination
1	2	3	4
1. COMPULSORY educational components			
1.1. General training cycle			
GC 01	Basis of Oral Professional Speech (Rhetoric)	2	final test
GC 02	History of Science and Technology	2	final test
GC 03	General Theory of Development	2	final test
GC 04	Basis of Healthy Lifestyle	3	final test
GC 05.1	Practical Course in Foreign Language. Part 1	3	final test
GC 05.2	Practical Course in Foreign Language. Part 2	3	final test
GC 06.1	Practical Course in Foreign Language for Specific Purposes. Part 1	3	final test
GC 06.2	Practical Course in Foreign Language for Specific Purposes. Part 2	3	exam
GC 07	Law	2	final test
GC 08	Economics and Production Engineering	4	final test
GC 09	Labour Safety and Civil Defense	4	final test
1.2. Vocational training cycle			
VC 01.1	Higher Mathematics. Part 1. Differential Calculus	4,5	exam
VC 01.2	Higher Mathematics. Part 2. Integral Calculus	5,5	exam
VC 02.1	Physics. Part 1. Mechanics. Heat	3	final test
VC 02.2	Physics. Part 2. Electromagnetism	5	exam
VC 03	Informatics and Systematology	6	exam
VC 04.1	Geodynamics of the Environment. Part 1. Soil Science	3	final test
VC 04.2	Geodynamics of the Environment. Part 2. Geology and Fundamentals of Geomorphology	3	final test
VC 04.3	Geodynamics of the Environment. Part 3. Landscape Ecology	4	exam
VC 05	Hydrology	4	final test
VC 06	Coursework in Hydrosphere Monitoring	1	final test
VC 07	Meteorology and Climatology	4	final test
VC 08	Chemistry and Fundamentals of Biogeochemistry	4,5	final test
VC 09	Biology	7	exam
VC 10	Human Ecology	8,5	exam
VC 11.1	Environmental Monitoring. Part 1. Environmental Control	4	exam
VC 11.2	Environmental Monitoring. Part 2. Instrumental Methods of Environmental Analysis	4	exam
VC 12	Environmental Modelling and Forecasting. Basis of GIS	4	exam
VC 13	Technoecology	4,5	exam
VC 14	Environmental Legislation and Environmental Law	3	final test
VC 15.1	Normalization of Anthropogenic Load on Environment. Part 1. Normalization of Anthropogenic Load on Environment	4	exam
VC 15.2	Normalization of Anthropogenic Load on Environment. Part 2. Environmental Impact Assessment	3	exam
VC 16	Coursework in Normalization of Anthropogenic Load on Environment	1	final test
VC 17	Environmental and Natural-Technogenic Safety	3	final test
VC 18	Environmental Protection Organization and Management	4	exam
VC 19	Specific Topics of Biogeochemistry	5,5	final test
VC 20	General Ecology	6	exam
VC 21	Course Project in Fundamentals of Design and Construction	1,5	final test
VC 22	Waste Utilization and Recuperation	4	exam
VC 23	Organic Chemistry	4	exam
VC 24	Physical and Colloid Chemistry	5	exam
VC 25.1	Analytical Chemistry. Part 1. Qualitative Analysis	5	exam

1	2	3	4
VC 25.2	Analytical Chemistry. Part 2. Quantitative Analysis	5,5	exam
VC 26	Course Project in Technologies and Design of Industrial Productions	1,5	final test
VC 27	Course Project in Atmosphere Protection	1,5	final test
VC 28	Pre-diploma Practice	6	final test
VC 29	defense Diploma Project	6	
2. OPTIONAL educational components			
2.1. General training cycle			
GO 01	Educational component 1 GU- Catalog	2	final test
GO 02	Educational component 2 GU- Catalog	2	final test
2.2. Vocational training cycle			
VO 01	Educational component 1 F-Catalog	4	final test
VO 02	Educational component 2 F-Catalog	4	final test
VO 03	Educational component 3 F-Catalog	4	final test
VO 04	Educational component 4 F-Catalog	4	final test
VO 05	Educational component 5 F-Catalog	4	final test
VO 06	Educational component 6 F-Catalog	4	final test
VO 07	Educational component 7 F-Catalog	4	final test
VO 08	Educational component 8 F-Catalog	4	final test
VO 09	Educational component 9 F-Catalog	4	final test
VO 10	Educational component 10 F-Catalog	4	final test
VO 11	Educational component 11 F-Catalog	4	final test
VO 12	Educational component 12 F-Catalog	4	final test
VO 13	Educational component 13 F-Catalog	4	final test
VO 14	Educational component 14 F-Catalog	4	final test
Total in compulsory components :		180	
Total in optional components :		60	
Total in educational components that ensure the acquisition of competencies defined by the SHE		120	
TOTAL in EDUCATIONAL PROGRAM		240	

3. STRUCTURAL AND LOGICAL SCHEME OF THE EDUCATIONAL PROGRAM



4. FORM OF FINAL EXAMINATION OF HIGHER EDUCATION APPLICANTS

Forms of final examination of higher education applicants	Attestation is carried out in the form of public defense of qualifying work.
Requirements for qualifying work	<p>The qualifying work involves solving a complex specialized task and/or practical problem in the field of ecology, environmental protection, balanced nature management and sustainable development, which is characterized by the complexity and uncertainty of conditions, requires the application of theoretical provisions and methods of environmental sciences.</p> <p>The defense of the qualifying work is completed with the issuance of a document of the established form on awarding the graduate a Bachelor's degree with the qualification: Bachelor of Environmental Studies.</p> <p>The qualifying work must be checked for plagiarism.</p> <p>The qualifying work must be posted on the website of the higher education institution or its structural subdivision https://eco-paper.kpi.ua/ (abstract), or in the repository of the higher education institution (Electronic Archive of Scientific and Educational Materials of Igor Sikorsky Kyiv Polytechnic Institute (ELAKPI)).</p>

5. MATRIX OF CORRESPONDENCE OF PROGRAM COMPETENCIES TO THE COMPONENTS OF THE EDUCATIONAL PROGRAM

	GC 01	GC 02	GC 03	GC 04	GC 05	GC 06	GC 07	GC 08	GC 09	VC 01	VC 02	VC 03	VC 04	VC 05	VC 06	VC 07	VC 08	VC 09	VC 10	VC 11	VC 12	VC 13	VC 14	VC 15	VC 16	VC 17	VC 18	VC 19	VC 20	VC 21	VC 22	VC 23	VC 24	VC 25	VC 26	VC 27	VC 28	VC 29			
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6. MATRIX OF PROVIDING OF PROGRAM LEARNING RESULTS BY RELEVANT COMPONENTS OF THE EDUCATIONAL PROGRAM

	GC.01	GC.02	GC.03	GC.04	GC.05	GC.06	GC.07	GC.08	GC.09	VC.01	VC.02	VC.03	VC.04	VC.05	VC.06	VC.07	VC.08	VC.09	VC.10	VC.11	VC.12	VC.13	VC.14	VC.15	VC.16	VC.17	VC.18	VC.19	VC.20	VC.21	VC.22	VC.23	VC.24	VC.25	VC.26	VC.27	VC.28	VC.29			
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