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 STUDIES

EDUCATIONAL AND SCIENTIFIC PROGRAM

the third (scientific) level of higher education

Program Subject Area	**101 Environmental Studies**
Field of Study	**10 Natural Sciences**
Qualification	**Doctor of Philosophy in Environmental Studies**

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

Kyiv – 2022

PREAMBLE

DEVELOPED by the project team:

Project team leader:
Gomelya Mykola Dmytrovych, Doctor of Technical Sciences, Professor, Head of the Department of Ecology and Plant Polymers Technology
Project team members:
Shabliy Tetyana Oleksandrivna, Doctor of Technical Sciences, Professor, Professor of the Department of Ecology and Plant Polymers Technology
Radovenchyk Vyacheslav Mykhailovych, Doctor of Technical Sciences, Professor, Professor of the Department of Ecology and Plant Polymers Technology
Brovarets Volodymyr Serhiyovych, Doctor of Chemical Sciences, Professor, Deputy Director of the V.P. Kukhar Institute of Bioorganic Chemistry and Petrochemistry of NASU
Khomenko Anna Serhiyivna, PhD student of the 2nd year of the group LE-01f

AGREED:

Scientific and Methodological Council of Igor Sikorsky Kyiv Polytechnic Institute for program subject area 101 Environmental Studies
Голова НМКУ 101 Екологія
_____ Mykola GOMELYA
(protocol № _6_ dated «_28__» ___12_____ 2021__ p.)

Methodological Council of Igor Sikorsky Kyiv Polytechnic Institute
Head of the Methodological Council
_____ Yuriy YAKYMENKO
(Protocol № ___ dated «___» _____ 20____ p.)

CONSIDERED:

1. The order of the Ministry of Education and Science of Ukraine dated December 23, 2021. № 1421 "On the approval of the standard of higher education in the program subject area 101 Environmental Studies for the third (educational and scientific) level of higher education.

2. Monitoring of the educational program was carried out in connection with the approval of the standard of higher education for the program subject area 101 Environmental Studies of the third (educational and scientific) level of higher education. It was updated according to the results of the monitoring, taking into account the proposals of the participants of the educational process involved in the implementation of the OP, the proposals of graduates, employers and other external stakeholders (https://eco-paper.kpi.ua/navchannia/osvitni-prohramy.html) and in order to ensure compliance standard of higher education.

The educational program was discussed after receiving all requests and proposals and approved at a meeting of the Department of Ecology and Technology of Plant Polymers (Minutes № 7 dated 27.12.2021).

CONTENT

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 - Doctor of Philosophy Educational qualification - Doctor of Philosophy in Environmental Studies
The official name of the EP	Environmental Studies
Type of diploma and scope of educational program	Doctor of Philosophy, educational component of 40 ECTS credits, training period 4 years. The scientific component involves conducting own research and presenting of its results in the form of a dissertation.
Availability of accreditation	Certificate of accreditation of educational program 2341, valid until 01.07.2027
Cycle / level of HE	NFQ of Ukraine - level 8 QF-EHEA – the third cycle EQF-LLL – level 8
Prerequisites	Master's degree
Language (s) of instruction	Ukrainian
Term of the EP	Until the next accreditation
Internet address of the permanent placement of the educational program	*https://osvita.kpi.ua/* section "Educational programs" *https://eco-paper.kpi.ua/ ,* section «Education» → "Educational programs"
2 – The goal of the educational program	
Training of a professional capable of solving complex problems and problems in the field of ecology and environmental safety, to carry out scientific-innovative activities, the results of which have scientific novelty, theoretical and practical significance; and, through a harmonious combination of general scientific knowledge, in-depth knowledge of the specialty and engineering tools, to successfully compete in the labor market in terms of sustainable innovative scientific technological development of society.	

3 – Characteristics of the educational program	
Subject area	*Objects of activity:* structure and functional components of ecosystems of different levels and origins; anthropogenic impact on the environment and optimization natural resource management. *Learning objectives:* acquiring the ability to generate new ideas, solve complex problems and carry out own scientific research in the field of ecology, environmental protection and nature resource management. *Theoretical content of the subject area.* The concepts, principles of modern ecology and their use for environmental protection, balanced nature management and sustainable development. *Methods, techniques and technologies.* General scientific, philosophical-ontological and natural science methods of research on the structure and properties of ecological systems of various levels and origins, methods of collecting, processing and interpreting the results of environmental studies, in particular, computer modeling methods. *Tools and equipment:* equipment, hardware and software necessary for field, laboratory and remote studies of the structure and properties of environmental systems of various levels and origins.
Orientation of the EP	Educational and Scientific
The main focus of the EP	Special education in the field of natural sciences, Program Subject Area in Environmental Studies Key words: biosphere, environmental systems, biocenosis, geotechnical systems, sustainable development, natural resources, anthropogenic load, resource saving, environmental protection, clean technologies. The program is based on the latest scientific advances in the field of environmental protection and conservation, taking into account the current level of technology, focuses on current scientific issues, within which it is possible to continue in scientific career in environmental monitoring, environmental management, natural resources management, resource management in the conditions of technogenesis, development of perspective technologies for the reduction of anthropogenic load on environment.

Features of the EP	The uniqueness of the program is based on a deep understanding of the state of ecological systems and the peculiarities of man-made impacts on them, the ability to modernize existing productions to increase their productivity while significantly reducing the volumes of harmful emissions, discharges, waste and levels of hazardous effects on the environment. ESP focuses on current scientific problems, within which a further scientific career is possible in the field of monitoring the state of the environment, management of environmental protection activities, rational use of natural resources in the conditions of technogenesis. The uniqueness of the program is emphasized by its educational and scientific components – a combination of fundamental theoretical knowledge and practical skills in the field of identifying environmental problems and environmental decision-making; by formalization and quantitative substantiation of decisions for the subsequent use of acquired knowledge in research, organizational, project work, structuring and organization of scientific and innovative activities.
4 – Qualification of graduates for employment and further studying	
Qualification for employment	Graduates can carry out professional activities by type of economic activity "Research and development in the field of natural and technical sciences" (Classifier of economic activities code 73.10, ISIC code 731). Graduates can provide services in research and experimental development in the field of natural sciences, as well as consulting services for environmental protection (code DK 016: 2010 72.19.19, 72.19.50, 74.90.13). Graduates can work in primary positions in the professions defined by the National Classification of Ukraine: Classifier of professions DK 003: 2010 2211.2 Environmental engineer 2211.2 Environmental expert 2149.1 Researchers (other fields of engineering) 2149.1 Junior researcher (engineering) 2310 Teachers of universities and higher educational institutions
Further training	Obtaining a doctoral degree and additional qualifications in the adult education system.

5 – Teaching and evaluation	
Teaching and learning	Learning through research, student-centered, personality-differentiated, problem-oriented, self-learning. All participants in the educational process are provided with timely and understandable information on the goals, content and program learning outcomes, the evaluation procedure and criteria within the individual educational components. Full preparation for research activities is provided through participation in research projects with the publication of results in scientific journals. Opportunities to present the results of scientific research are provided, in particular, through the annual International scientific-practical conferences "Ecology. Human. Society" and "Clean Water. Fundamental, applied and industrial aspects".
Evaluation	Current and semester control is carried out in accordance with the Rating system in the form of reports, presentations, tests and exams.
6 – Program competencies	
Integral competence	The ability to produce new ideas, to solve complex problems in the field of ecology, environmental protection and rational nature management, which involves a deep rethinking of existing and the creation of new integral knowledge and/or professional practice, to apply contemporary methodologies of scientific and scientific-pedagogical activity, to carry out own scientific research, the results of which have scientific novelty, theoretical and practical significance.
General competences (GC)	
GC 1	The ability to work in an international context.
GC 2	The ability to solve complex problems on the basis of a systematic scientific and general cultural worldview in compliance with the principles of professional ethics and academic integrity.
Professional (special) competencies (PC)	
PC 03	The ability to perform original research, to achieve scientific results that create new knowledge in the field of ecology and interdisciplinary areas related to it, to evaluate and ensure the quality of the performed research.
PC 04	The ability to initiate, develop and implement complex innovative projects in the field of ecology and related interdisciplinary projects, leadership during their implementation
PC 05	The ability to use contemporary tools, electronic information resources, specialized software in scientific and educational activities, in particular for modeling of processes and making optimal decisions in the field of ecology, nature protection and rational nature management
PC 06	The ability to carry out scientific and pedagogical activities in higher education
PC 07	Ability to make critical analysis, evaluation and synthesis of new and complex ideas

PC 08	The ability to adapt and generalize the results of modern research in the environmental field to solve scientific and practical problems
PC 09	Based on the determination of the levels of environmental threats from existing industries, the ability to modernize the system for controlling negative impacts and to develop effective measures to protect the environment, to determine directions for the organization improving, management, and modernization of industries to ensure effective resource saving
PC 10	Ability to determine the technophilicity of natural areas, levels of man-made impact from objects of economic activity and, on the basis of comparative analysis, to develop a reliable system of environmental protection in the conditions of modern technogenesis
7 – Program learning outcomes (PO)	
PO 01	To deeply understand the conceptual principles and methodology of the natural sciences, to formulate and test hypotheses, to use appropriate evidence to substantiate conclusions, in particular, the results of theoretical analysis, experimental studies and mathematical and/or computer modeling in order to solve significant scientific and applied scientific problems ecology.
PO 02	To plan and carry out experimental and/or theoretical research on ecology, environmental protection and optimization of nature management using up-to-date tools, to critically analyze the results of own research and the results of other researchers in the context of the entire complex of modern knowledge on the investigated problem.
PO 03	To freely present and discuss the research results, scientific and applied problems in ecology, environmental protection and optimization of nature management in national and foreign languages in compliance with the norms of academic ethics, to competently reflect the results of research in scientific publications in leading national and international scientific journals.
PO 04	To develop and teach specific academic disciplines related to the subject area of ecology in higher education institutions.
PO 05	To develop and implement scientific and/or innovative engineering projects to rethink existing and create new holistic knowledge and/or professional practice with social, ethical, economic, environmental, and legal considerations.
PO 06	To apply state-of-the-art tools and techniques for finding processing and analyzing information on environmental and issues, particularly statistical methods for analyzing high volume and/or complex data, specialized databases, and information systems.
PO 07	To have up-to-date conceptual knowledge and high methodological level in the field of ecology and at the boundaries of subject branches, as well as research skills sufficient for conducting scientific and applied research at the level of the latest world achievements.
PO 08	To know the priority state directions for the development of science, technology and engineering in professional and related fields

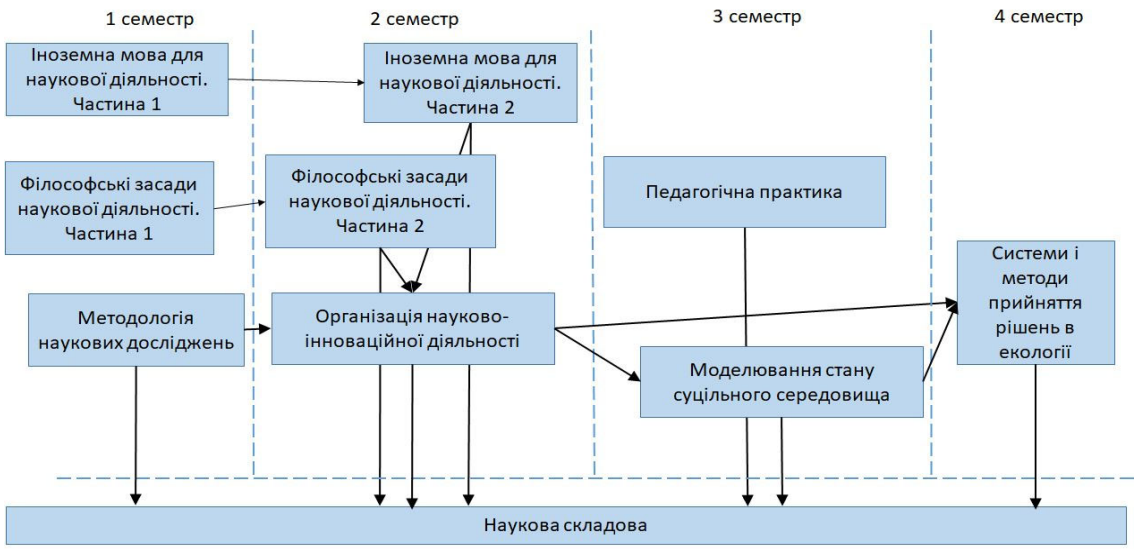
PO 09	To demonstrate awareness of contemporary environmental protection strategies, environmental legislation, regulations on environmental protection
PO 10	To determine and justify the acceptable consumption rate of vital raw materials, materials, soils, water resources without significant deterioration of the environment
PO 11	To develop an action plan for reliable control of man-made factors on the environment, to create systems to protect the environment from harmful effects

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: Staffing complies with the current Licensing terms.
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 research and training complexes "Environmentally friendly technologies for humans" and "Surface Chemistry and Physics" of Igor Sikorsky KPI and the Department of Chemistry of the National Academy of Sciences of Ukraine, on the basis of which PhD students learn from the field of solving environmental problems. There is an option of remote information exchange and interaction with teachers.
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	The training of foreign applicants participating in international academic mobility programs can be carried out on general grounds, provided that the applicant's command of the language of instruction is at B2 level and above.

2. LIST OF COMPONENTS OF THE EDUCATIONAL COMPONENT OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM

Code	Components of the educational program (disciplines, course projects (works), practice)	ECTS Credits	Final examination
Compulsory educational components			
Educational disciplines for mastering general scientific competences			
C 01.1	Philosophical Foundations of Scientific Activity. Part 1. Scientific Worldview and Ethical Culture of a Scientist	2	final test
C 01.2	Philosophical Foundations of Scientific Activity. Part 2. Philosophical Epistemology	4	exam
Educational disciplines for acquiring language competencies			
C 02.1	Foreign Language for Scientific Activity. Part 1. Scientific Research	3	final test
C 02.2	Foreign Language for Scientific Activity. Part 2. Scientific Communication	3	exam
Educational disciplines for acquiring in-depth knowledge of the specialty			
C 03	Methodology of Scientific Research	4	exam
C 04	Simulation of the State of Continua	4	exam
C 05	Systems and Methods of Decision Making in Ecology	4	exam
Educational disciplines for the acquisition of general competencies of a researcher			
C 06	Organization of Scientific and Innovative Activities	4	final test
C 07	Pedagogical Practice	2	final test
Optional educational components			
O 1	Educational component 1 F-Catalog	5	final test
O 2	Educational component 2 F-Catalog	5	final test
Total in **compulsory components**:		**30**	
Total in **optional components**:		**10**	
Total in educational components **that ensure the acquisition of competencies defined by the SHE**		**22**	
TOTAL in EDUCATIONAL PROGRAM		**40**	

3. STRUCTURAL AND LOGICAL SCHEME OF THE EDUCATIONAL PROGRAM



4. SCIENTIFIC COMPONENT

Year of training	The content of the PhD student's scientific work	Form of control
1st year	Choosing and substantiating the subject of own scientific research; formation of an individual work plan; selection and substantiation of the methodology of own scientific research; review and analysis of existing points of view and approaches in the chosen research field; carrying out of the dissertation work under guidance of the supervisor. Preparation and publication of at least 1 article on the topic of the dissertation in accordance with current requirements.	Approval of the individual plan of the PhD student's work at the scientific council of the institute / faculty, reporting on the progress of the PhD student's individual work plan performance twice a year.
2nd year	Conducting own scientific research under the guidance of the supervisor; preparation and publication of at least 1 article on the topic of the dissertation in accordance with current requirements; participation in scientific and practical conferences (seminars) with the publication of abstracts.	Reporting on the progress of the PhD student's individual work plan performance twice a year.
3rd year	Conducting own scientific research under the guidance of the supervisor; preparation and publication of at least 1 article on the topic of the dissertation in accordance with current requirements; participation in scientific and practical conferences (seminars) with the publication of abstracts.	Reporting on the progress of the PhD student's individual work plan performance twice a year.
4th year	Finalizing of the dissertation; execution of the scientific achievements of the PhD student in the form of a dissertation thesis, summing up the completeness of the coverage of the results of the dissertation in scientific articles, according to the requirements. Implementation of the obtained results and the receipt of supporting documents. Submission of documents for preliminary examination of the dissertation. Preparation of a scientific report for final examination (dissertation defense).	Reporting on the progress of the PhD student's individual work plan performance twice a year. Providing a conclusion on the scientific novelty, theoretical and practical significance of the results of the dissertation.

5. FORM OF FINAL EXAMINATION OF HIGHER EDUCATION APPLICANTS

Attestation of applicants of the degree of Doctor of Philosophy in the educational program "Environmental Studies" of the specialty 101 "Environmental Studies" is carried out in the form of a public defense of the dissertation and is completed by issuing a document of the established form on awarding the graduate the degree of Doctor of Philosophy with awarding the qualification: Doctor of Philosophy in Environmental Studies. The dissertation thesis for the degree of Doctor of Philosophy is independent comprehensive research that offers a solution to a specific scientific problem in the field of ecology or on its border with other specialties, the results of which are an original contribution to the development of ecology and are published in scientific articles in peer-reviewed scientific journals. The dissertation should not contain academic plagiarism, falsification, fabrication. The dissertation must be published on the official website of the higher education institution or its division, or in the repository of STL of the University.

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

	C 01	C 02	C 03	C 04	C 05	C 06	C 07	Scientific component
GC 01		+				+		+
GC 02	+				+		+	+
PC 03	+		+	+	+			+
PC 04						+		+
PC 05			+	+	+		+	+
PC 06							+	+
PC 07	+		+		+	+	+	+
PC 08					+	+		+
PC 09					+			+
PC 10					+			+

7. MATRIX OF PROVIDING OF PROGRAM LEARNING OUTCOMES BY RELEVANT COMPONENTS OF THE EDUCATIONAL PROGRAM

	C 01	C 02	C 03	C 04	C 05	C 06	C 07	Scientific component
PO 01	+				+	+	+	+
PO 02	+		+	+	+		+	+
PO 03	+	+			+	+	+	+
PO 04	+		+	+	+		+	+
PO 05		+				+		+
PO 06	+		+	+	+	+	+	+
PO 07	+	+	+	+	+	+	+	+
PO 08					+	+		+
PO 09					+	+		+
PO 10					+			+
PO 11					+			+