The National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Ecology and technology of plant polymers

Pre-diploma practice

Working program of practice (Syllabus)

Educational component details	
Level of higher education	***First (bachelor's)***
Discipline	*10 Natural Sciences*
Specialty	*101 Ecology*
Educational program	*Environmental safety*
Status of the educational component	*Regulatory*
Form of study	*full-time/distance/mixed*
Year of training, semester	*4th year, 8th semester*
The scope of the educational component	*6 credits, 180 hours*
Semester control/control measures	*Test*
Class schedule	*According to the curriculum*
Language of instruction	*Ukrainian*
Information about the course leader	Responsible for organizing the practice is Ovsyankina Viktoriia Alekseevna: *https://eco-paper.kpi.ua/pro-kafedru/vykladachi/ovsyankina-viktoriya-oleksijivna.html* Practice leaders: *https://eco-paper.kpi.ua/pro-kafedru/vykladachi*
Course placement	*https://eco-paper.kpi.ua/navchannia/praktyka.html*

Educational component program

1. Description of the educational component, purpose, subject of study and learning outcomes

Pre-diploma practice *is a mandatory educational component for obtaining a bachelor's degree in the specialty 101 - Ecology, educational program Environmental Safety.*

Pre-diploma practice aims to systematize, expand and consolidate professional knowledge, and form in students the initial competencies for conducting independent design work.

The main content of pre-diploma practice is to involve students in independent analytical and design work, familiarization with technological processes at various enterprises, and issues of implementing theoretical and practical developments in the field of their professional activity.

The subject of undergraduate pre-diploma practice is to deepen the skills of independent theoretical and practical work, broaden students' worldview, study practical problems and the ability to connect them with the chosen direction, and determine the structure and logic of the future diploma project.

The purpose of the pre-diploma practice in the specialty 101 - Ecology is to form ***the following competencies*** *in students :*

- *knowledge and understanding of the subject area and professional activity;*

- *the ability to adapt and act in a new situation;*
- *ability to communicate in the state language both orally and in writing;*
- *ability to communicate with representatives of other professional groups at different levels (with experts from other fields of knowledge/types of economic activity);*
- *the ability to act socially responsible and conscious;*
- *the ability to conduct research at the appropriate level;*
- *ability to work in a team;*
- *interpersonal skills;*
- *ability to evaluate and ensure the quality of work performed;*
- *the ability to assess the impact of technogenesis processes on the state of the environment and identify environmental risks associated with production activities;*
- *ability to use the basic principles and components of environmental management;*
- *the ability to conduct environmental monitoring and assess the current state of the environment;*
- *ability to participate in the development of a system for managing and treating production and consumption waste;*
- *ability to use modern information resources for environmental research;*
- *the ability to master international and domestic experience in solving regional and transboundary environmental problems;*
- *ability to participate in the management of environmental protection activities and/or environmental projects;*
- *the ability to develop design and working technical documentation in the field of environmental technologies, to draw up structural diagrams with elements of equipment and industrial buildings, to draw up completed design and construction developments;*
- *the ability to distinguish between technological processes of production, determine the sources and routes of entry of harmful components into the environment, and assess their impact on human health and environmental quality.*

According to the requirements of the pre-diploma practice program , students must demonstrate the following ***program learning outcomes*** *after completing it* ***:***

- *demonstrate understanding of the basic principles of managing environmental activities and/or environmental projects;*
- *understand basic environmental laws, rules and principles of environmental protection and nature management;*
- *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 nature use;*
- *use the management principles on which the environmental safety system is based;*
- *know the conceptual foundations of monitoring and regulating anthropogenic environmental impact;*
- *identify factors that determine the formation of landscape and biological diversity;*
- *solve problems in the field of environmental protection using generally accepted and/or standard approaches and international and domestic experience;*
- *be able to search for information using appropriate sources to make informed decisions;*
- *demonstrate skills in assessing unforeseen environmental problems and making thoughtful choices about how to solve them;*
- *be able to use software, GIS technologies and Internet resources for information support of environmental research;*
- *be able to predict the impact of technological processes and production on the environment;*
- *participate in the development and implementation of projects aimed at optimal management and treatment of industrial and municipal waste;*
- *be able to form effective communication strategies to convey ideas, problems, solutions and own experience in the field of ecology;*

- *be able to communicate the results of activities to a professional audience and the general public, make presentations and reports;*
- *be able to explain the social, economic and political consequences of implementing environmental projects;*
- *choose the optimal strategy for holding public hearings on the problems and formation of territories of the nature reserve fund and ecological network;*
- *to be aware of responsibility for the effectiveness and consequences of the implementation of comprehensive environmental protection measures;*
- *combine independent and teamwork skills to achieve results with an emphasis on professional integrity and responsibility for decision-making;*
- *be able to choose the optimal methods and tools for conducting research, collecting and processing data;*
- *participate in the development of projects and practical recommendations for environmental conservation;*
- *demonstrate skills in implementing environmental protection measures and projects;*
- *apply methodologies and technologies for designing, implementing and introducing environmental protection technologies and equipment, and carry out design and construction activities;*
- *carry out technological and hydraulic calculations of treatment facilities, prepare energy and material balances of devices, perform parametric calculations of equipment, select typical designs in construction, and prepare master plans of industrial enterprises;*
- *to assess the state of the environment, determine the level of impact of the enterprise (production) on the environment, determine the main environmental pollutants of this enterprise (production);*
- *develop technologies, use processes and devices that ensure effective separation, concentration, extraction, destruction of harmful impurities in water systems and gas environments, processing and disposal of waste.*

2. Prerequisites and postrequisites of the educational component (place in the structural and logical scheme of training according to the relevant educational program)

The completion of pre-diploma practice is based on the knowledge students have acquired in basic professional disciplines. Pre-diploma practice is the foundation for preparing students for the completion of a diploma project (Diploma Design) or for other forms of final certification.

To successfully complete pre-diploma practice, students must master the main professional and general disciplines in the specialty 101 - Ecology: History of science and technology, Foreign language of professional orientation, Economics and organization of production, Occupational safety and civil protection, Informatics and systematics, Geodynamics of the ecological environment, Hydrology, Meteorology and climatology, Chemistry with the basics of biogeochemistry, Human ecology, Environmental monitoring, Modeling and forecasting of the state of the environment. Fundamentals of GIS, Technoecology, Standardization of anthropogenic load on the environment, Ecological and natural and technogenic safety, Organization and management of environmental protection activities, General ecology, Waste disposal and recovery, Analytical chemistry, Course project on technologies and design of industrial production, Course project on atmospheric protection.

3. Practice content

Pre-diploma practice consists of the following stages (the stages and their sequence may be changed depending on the conditions of the individual assignment):

- receiving an individual assignment and internship schedule, familiarizing yourself with the internship program;

- completion of an internship briefing, safety briefing (in the case of full-time internship);

- theoretical study of technological processes, production, specific enterprises (depending on the individual task);

- detailed analysis and study of the main pollutants and factors of negative impact on a specific process, production or enterprise;

- study of the main factors of water pollution, atmospheric emissions, and solid industrial (household) waste;

- description of the main processes implemented in a specific technological scheme (production process, etc.);

- characteristics of the negative impacts on the environment and human health of compounds formed in the specified technological process (at a separate enterprise, etc.);

- search and analysis of modern technologies that can improve (improve individual indicators) of a separate technological process (technology, production, etc.);

- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);

- drawing up a practice diary;

- preparation of a practice report;

- protection of practice results.

Before completing the internship, students must undergo a briefing on the internship, safety precautions and fire prevention (in the case of a full-time internship format). Before the internship, students receive an individual task from the internship supervisors from the department, completing which, students become familiar with and study in detail a certain process or operation of equipment (technological scheme or the operation of a separate enterprise), methods of quality control of wastewater treatment at one of the stages of treatment, measures for the rational use of natural resources and environmental protection, etc. By completing an individual task, students expand their engineering and technical outlook, gain experience and specialist qualifications. Students also get acquainted with the technological scheme of wastewater treatment at treatment facilities, with the equipment involved in the scheme, its design and technological features, advantages and disadvantages, and make sketch drawings (if necessary) of the main equipment, components and blocks of the scheme.

During pre-diploma internship, students collect the necessary material to complete an individual assignment and diploma project (prepare for other forms of graduation certification).

4. Educational materials and resources

Basic literature

1. *Regulations on the practice of students of higher educational institutions of Ukraine: Order of the Ministry of Education of Ukraine dated April 8, 1993 No. 93.*
2. *Methodological recommendations on the organization of student practice and drawing up work programs for practice at the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" [Text] / Compiled by: N. M. Lapenko, I. L. Spivak, I. V. Fedorenko, O. M. Shapovalova; edited by P. M. Yablonsky. – Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2018. – 29 p.*
3. *Regulations on the procedure for conducting internships for higher education applicants of the National Technical University of Ukraine "Igor Kyiv Polytechnic Institute" Sikorsky" was approved by the*

order of the Rector, ORDER No. 7/172 dated 09/24/2020. [electronic resource] . - Access mode - https://document.kpi.ua/files/2020_7-172.pdf. - Screen name.-

Language Ukrainian.

Additional literature

4. Radovenchyk V. M., Gomelya M. D., Radovenchyk Ya. V. Waste utilization and recovery / Textbook. – Kyiv: Condor, 2021. – 246 p.

5. Sarapina M. V. Processes and devices for dust and gas purification: course of lectures. Kharkiv: NUCZU, 2018. 125 p.

6. Technoecology: textbook / O.I. Ivanenko, Y.V. Nosachova. — Kyiv: Publishing House "Kondor", 2017. — 294 p.

7. Environmental safety: a textbook / Krasnyansky M.Yu. – K.: Publishing house "Kondor", 2018. – 180 p.

8. Trus I.M., Galysh V.V., Skyba M.I., Radovenchyk Ya.V., Gomelya M.D. New highly effective methods of purification from soluble and insoluble pollutants: monograph. / – K.: Kondor-Publishing House, 2020. – 272 p.

9. Shadura V.O., Kravchenko N.V. Water supply and wastewater disposal: a textbook – Rivne: NUVGP, 2018. – 343 p.

10. Radovenchyk Ya.V., Gomelya M.D. Physico-chemical methods of water purification. Textbook. – K.: Condor-Publishing House, 2016. – 264 p.

11. Gomelya M. D., Shablii T. O., Radovenchyk Ya. V. Physico-chemical foundations of water purification processes: textbook. – K.: Condor-Publishing House, 2019. – 256 p.

12. Radovenchyk V.M. Fundamentals of land hydrology and oceanology / V.M. Radovenchyk, M.D. Gomelya, Yu.A.
Omelchenko. – Sevastopol: SNUYAE and P, 2018. – 176 p.

13. Krusir G. V., Madani M. M., Garkovych O. L. Techniques and technologies for cleaning gas emissions. Odesa: ONAKHT-Odesa, 2017. 207 p.

14. Beketov V. E., Yevtukhova G. P. Sources and processes of atmospheric pollution. Kharkiv: O. N. Beketov KhNUMG, 2019. 113 p.

Information resources on the Internet

15. Scientific and Technical Library named after G.I. Denysenko, Igor Sikorsky Kyiv Polytechnic Institute - http://www.library.kpi.ua

16. Electronic archive of Igor Sikorsky Kyiv Polytechnic Institute - http://www.ela.kpi.ua

17. Department of Ecology and Technology of Plant Polymers, Igor Sikorsky Kyiv Polytechnic Institute - https://eco-paper.kpi.ua

18. Professional Association of Ecologists of Ukraine (PAEU) - https://paeu.com.ua/

Educational content

5. **Independent student work, consultations on pre-graduate practice**

The student's independent work during the pre-diploma internship takes up 100% of the time allocated for the internship. The main task of independent work is to complete all the points specified in the individual assignment. The student independently processes and prepares materials, conducts a literature search, analysis and comparison of the information received. The student independently draws up a report on the internship.

The practice supervisor constantly monitors the process of completing the practice. Once a week, he listens to the student's oral report on the stages of completing the individual task. The student supervisor and any other teacher of the department are always in touch with the students throughout the entire period of the practice and in case of any questions regarding the completion of the individual task (or any other questions regarding the practice) promptly help the students to resolve them.

If necessary, the internship supervisor may organize meetings for students with the involvement of Igor Sikorsky Kyiv Polytechnic Institute teachers and representatives of relevant enterprises/organizations.

Ensuring program outcomes through educational components

Program result	***Stages***
demonstrate understanding of the basic principles of managing environmental activities and/or environmental projects;	*drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);*
understand basic environmental laws, rules and principles of environmental protection and nature management;	*- theoretical study of technological processes, production, specific enterprises (depending on the individual task);* *- detailed analysis and study of the main pollutants and factors of negative impact on a specific process, production or enterprise;* *- study of the main factors of water pollution, atmospheric emissions, and solid industrial (household) waste;*
understand the basic concepts, theoretical and practical problems in the field of natural sciences, which are necessary for analysis and decision-making in the field of ecology, environmental protection and optimal nature use	*- theoretical study of technological processes, production, specific enterprises (depending on the individual task);* *- detailed analysis and study of the main pollutants and factors of negative impact on a specific process, production or enterprise;* *- study of the main factors of water pollution, atmospheric emissions, and solid industrial (household) waste;*
use the management principles on which the environmental safety system is based;	*- search and analysis of modern technologies that can improve (improve individual indicators) of a separate technological process (technology, production, etc.);*
know the conceptual foundations of monitoring and regulating anthropogenic environmental impact;	*- theoretical study of technological processes, production, specific enterprises (depending on the individual task);* *- detailed analysis and study of the main pollutants and factors of negative impact on a specific process, production or enterprise;*

identify factors that determine the formation of landscape and biological diversity	*detailed analysis and study of the main pollutants and factors of negative impact of a specific process, production or enterprise;* *- study of the main factors of water pollution, atmospheric emissions, and solid industrial (household) waste;*
solve problems in the field of environmental protection using generally accepted and/or standard approaches and international and domestic experience;	*search and analysis of modern technologies that can improve (improve individual indicators) of a particular technological process (technology, production, etc.);* *- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);*
be able to search for information using appropriate sources to make informed decisions;	*preparation of a practice report;* *- protection of practice results.*
demonstrate skills in assessing unforeseen environmental problems and making thoughtful choices about how to solve them;	*- search and analysis of modern technologies that can improve (improve individual indicators) of a separate technological process (technology, production, etc.);*
be able to use software, GIS technologies and Internet resources for information support of environmental research;	*- search and analysis of modern technologies that can improve (improve individual indicators) of a separate technological process (technology, production, etc.);* *- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);*
be able to predict the impact of technological processes and production on the environment;	*- theoretical study of technological processes, production, specific enterprises (depending on the individual task);* *- detailed analysis and study of the main pollutants and factors of negative impact on a specific process, production or enterprise;* *- study of the main factors of water pollution, atmospheric emissions, and solid industrial (household) waste;*
participate in the development and implementation of projects aimed at optimal management and treatment of industrial and municipal waste;	*- search and analysis of modern technologies that can improve (improve individual indicators) of*

	a separate technological process (technology, production, etc.); *- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);* *- drawing up a practice diary;* *- preparation of a practice report;* *- protection of practice results.*
be able to form effective communication strategies to convey ideas, problems, solutions and own experience in the field of ecology;	*- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);* *- drawing up a practice diary;* *- preparation of a practice report;* *- protection of practice results*
be able to communicate the results of activities to a professional audience and the general public, make presentations and reports;	*- preparation of a practice report;* *- protection of practice results*
be able to explain the social, economic and political consequences of implementing environmental projects;	*- search and analysis of modern technologies that can improve (improve individual indicators) of a separate technological process (technology, production, etc.);* *- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);*
choose the optimal strategy for holding public hearings on the problems and formation of territories of the nature reserve fund and ecological network;	*- characteristics of the negative impacts on the environment and human health of compounds formed in the specified technological process (at a separate enterprise, etc.);* *- search and analysis of modern technologies that can improve (improve individual indicators) of a separate technological process (technology, production, etc.);*
to be aware of responsibility for the effectiveness and consequences of the implementation of comprehensive environmental protection measures	*- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);*
combine independent and teamwork skills to achieve results with an emphasis on professional integrity and responsibility for decision-making;	*- search and analysis of modern technologies that can improve (improve individual indicators) of a separate technological process (technology, production, etc.);*

be able to choose the optimal methods and tools for conducting research, collecting and processing data;	*- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);*
participate in the development of projects and practical recommendations for environmental conservation;	*- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);* *- drawing up a practice diary;* *- preparation of a practice report;*
demonstrate skills in implementing environmental protection measures and projects	*- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);* *- protection of practice results.*
apply methodologies and technologies for designing, implementing and introducing environmental protection technologies and equipment, carry out design and construction activities	*- search and analysis of modern technologies that can improve (improve individual indicators) of a separate technological process (technology, production, etc.);* *- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);*
carry out technological and hydraulic calculations of treatment facilities, prepare energy and material balances of devices, perform parametric calculations of equipment, select typical designs in construction, and prepare master plans of industrial enterprises;	*- theoretical study of technological processes, production, specific enterprises (depending on the individual task* *- description of the main processes implemented in a specific technological scheme (production process, etc.);*
to assess the state of the environment, determine the level of impact of the enterprise (production) on the environment, determine the main environmental pollutants of this enterprise (production);	*- theoretical study of technological processes, production, specific enterprises (depending on the individual task);* *- detailed analysis and study of the main pollutants and factors of negative impact on a specific process, production or enterprise;* *- study of the main factors of water pollution, atmospheric emissions, and solid industrial (household) waste;*
develop technologies, use processes and devices that ensure effective separation, concentration, extraction, destruction of harmful impurities in water systems and gas environments, processing and disposal of waste.	*- search and analysis of modern technologies that can improve (improve individual indicators) of a separate technological process (technology, production, etc.);*

	- drawing up conclusions on the possibility (expediency) of modernizing the enterprise (a separate technological scheme, process, etc.);

Policy and control

6. Educational component policy

Rules for assigning incentive and penalty points

- *Incentive points can be awarded by the internship supervisor exclusively for performing creative work or additional completion of online specialized courses that correspond to the topic of the individual assignment, with the receipt of the appropriate certificate. The internship supervisor separately selects specialized courses for each individual assignment. Well-known platforms can be used to complete the courses, for example, such as:*

- *https://prometheus.org.ua*
- *https://coursera.org/*
- *Sikorsky Platform*

The maximum number of incentive points cannot exceed 10 % of the rating scale.

- *There are no penalty points during practice.*

Deadline and Rescheduling Policy

In the event of arrears or any force majeure circumstances, students should contact the supervisor via available communication channels to resolve problematic issues and agree on a course of action.

Academic Integrity Policy

Plagiarism and other forms of dishonest work are unacceptable. Plagiarism includes the lack of references when using printed and electronic materials, quotes, opinions of other authors. Hints and copying when writing tests, conducting classes are unacceptable; taking credit for another graduate student; copying materials protected by the copyright system without the permission of the author of the work.
The policy and principles of academic integrity are defined in Section 3 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". More details: https://kpi.ua/code

Academic Conduct and Ethics Policy

During their internship, students must be tolerant, respect the opinions of others, formulate objections in a correct form, and maintain a constructive dialogue with their supervisor and colleagues.
The norms of ethical behavior of students and employees are defined in Section 2 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". More information: https://kpi.ua/code

7. Types of control and rating system for assessing learning outcomes (RSO)

Distribution of study time by types of classes and tasks according to the working curriculum:

Semester	*Study time*		*Distribution of study hours*				*Control measures*		
	Credits	*Acad. hours*	*Lectures*	*Practical*	*Lab work*	*IWS*	*MCT*	*RR*	*Semester control*
8	*6*	*180*	*-*	*-*	*–*	*180*	*-*	*–*	*test*

A student's rating during pre-graduate internship consists of additional (incentive) points (no more than 10 points) that he receives during the internship and the points he receives when passing the internship test.

The semester test is a credit.

No later than a week after the end of the internship, the student takes a credit for the internship to a commission consisting of the student's internship supervisor, supervisors of other students, and department teachers. The composition of the commission is formed by the head of the department. To be admitted to the credit, the student must fill out and sign the internship diary with the supervisor, prepare a report on the internship. The student must complete the diary and report and submit them to the supervisor for review.

The grade for practice is taken into account along with other grades that characterize the student's success. The results of taking practice tests are entered into the examination records, are recorded in the grade book and in the progress log. A student who has not completed the practice program, or has received negative feedback from the practice supervisor, or has not passed the test, is sent to practice a second time during the vacation period, or is expelled from the university.

Rating system for taking the pre-degree internship test:

- 100-95 points – the student provided the most clear, correct and comprehensive answers to all questions posed by the commission representatives; the student submitted the report and diary on time for verification; the quality of the report received the maximum rating from the internship supervisor; the student did not receive any comments during the entire period of the pre-graduate internship.

- 94-80 – the student provided complete answers to most questions, but there are some inaccuracies in the answers; the report has shortcomings in the design or structure of the work; the report does not contain all the necessary information; the individual task was completed by no more than 80%; in general, there are no significant comments about the student.

- 79-60 – the individual task is completed by no more than 60-70%; the student cannot provide clear answers to the commission's questions; the report contains significant errors or a significant amount of necessary information is missing.

To obtain a credit score, the sum of all rating points received is converted according to the table:

Number of points	***Rating***
95...100	*perfectly*
85...94	*very good*
75...84	*good*
65...74	*satisfactorily*
60...64	*enough*
RD <60	*unsatisfactorily*
Admission conditions not met	*not allowed*

Pre-graduate internship work program (syllabus):

Compiled by *Assoc . Prof., Ph.D., Ovsyankina V.O.*

Approved *by the Department of EtaTRP (protocol No. 17 dated 05/29/2025)*
Approved *by the IHF Methodological Commission (protocol No. 11 dated 27.06.2025)*