



Master's Thesis

Work program of the discipline (Syllabus)

Requisites of the Course

Level of higher education	<i>Second (Master's)</i>
Field of Study	<i>10 Natural Sciences</i>
Program Subject Area	<i>101 Environmental Studies</i>
Education Program	<i>Environmental safety</i>
Type of Course	<i>Compulsory</i>
Mode of Studies	<i>full-time /part-time / distance / mixed</i>
Year of study, semester	<i>2 year (1 semester)</i>
ECTS workload	<i>12 credits (360 hours)</i>
Testing and assessment	<i>Defense</i>
Course Schedule	<i>Self-work</i>
Language of Instruction	<i>Ukrainian</i>
Course Instructors	<i>Supervisor: https://eco-paper.kpi.ua/pro-kafedru/vykladachi</i>
Access to the course	

Outline of the Course

1. Course description, goals, objectives, and learning outcomes

A master's thesis is a type of qualifying work of a graduate of the MSc educational and qualification level, intended for objective control of the degree of formation of scientific and research competences, is an independent study of current problems in the field of environmental safety.

The Master's thesis is a final qualifying work of scientific content, which has internal unity and reflects the results of the development of the chosen topic. It should correspond to the current level of development of environmental safety, and its topic should be relevant.

The Master's thesis is presented in a form that allows judgement how fully its provisions, conclusions and recommendations, their novelty and significance are reflected and substantiated. The totality of the results obtained in such work indicates that the master's student has the skills of scientific work in the chosen field of professional activity.

The work on the Master's thesis allows to reveal the skills of its author: to plan experimental studies, to conduct them and process experimental data, to analyze the obtained results; to work with technical and reference literature; to express one's thoughts in a technically competent language, to know the key problems in the field of the chosen Master's program and contemporary scientific means of their analysis and solution; to formulate and solve tasks that arise in the course of scientific research and require in-depth professional knowledge, to choose the necessary research methods and information technologies, to present the results of the work performed in the form of reports, abstracts, articles; to independently carry out scientific research works according to the selected program.

The subject of the Master's thesis is the development of new approaches (methods, algorithms, models, etc.) to solve a certain range of tasks or a single problem that cannot be solved by known methods. The Master's thesis should have some practical significance. The main conclusions of the work should serve as the basis of specific recommendations and measures to improve those processes and phenomena that are the subject of research in the dissertation.

The purpose of the Master's thesis is to determine the level of preparedness of a student to solve a complex of scientific problems and applied tasks based on the application of the system of theoretical knowledge and practical skills acquired during the entire period of study. In accordance with the goal, the training of Master's students in this Subject Area requires strengthening of the developed competencies:

- *the ability to learn and master modern knowledge;*
- *the ability to make informed decisions;*
- *the ability to generate new ideas (creativity);*
- *the ability to search, process and analyze information from various sources;*
- *the ability to develop and improve methods and technologies;*
- *awareness at the level of the latest achievements, necessary for research and/or innovative activities in the field of ecology, environmental protection and balanced nature management;*
- *the ability to apply interdisciplinary approaches to critical understanding of environmental problems;*
- *the ability to apply new approaches to the analysis and forecasting of complex phenomena, critical understanding of problems in professional activity;*
- *the ability to demonstrate knowledge and own conclusions to professionals and non-professionals;*
- *the ability to manage the strategic development of the team in the process of carrying out professional activities in the field of ecology, environmental protection and balanced nature management;*
- *the ability to self-education and professional development based on innovative approaches in the field of ecology, environmental protection and balanced nature management;*
- *the ability to assess the level of negative impact of natural and anthropogenic factors of environmental hazards on the environment and humans;*
- *the ability to develop a complex of management solutions;*
- *the ability to collect and process information in order to obtain parameters characterizing the state of the environment.*

*According to the requirements of the Master's training program, in the process of preparing and defending a Master's thesis, students must demonstrate the following **program learning outcomes**:*

- *to know and understand the fundamental and applied aspects of environmental sciences;*
- *to be able to use conceptual environmental patterns in professional activities;*
- *to know the basic concepts of natural science, sustainable development and methodology of scientific knowledge at the level of the latest achievements;*
- *to know the legal and ethical standards for the assessment of professional activity, development and implementation of socially significant environmental projects in the conditions of conflicting requirements;*
- *to demonstrate the ability to organize collective activities and implement complex environmental projects, taking into account available resources and time constraints;*
- *to know the latest methods and tools of environmental research, including methods and tools of mathematical and geoinformation modeling;*
- *to be able to communicate in a foreign language in scientific, industrial and social spheres of activity;*
- *to be able to communicate professional knowledge, own justifications and conclusions to specialists and the general public clearly and unambiguously;*
- *to know the principles of personnel and resource management, the basis of approaches to decision-making in conditions of incomplete, insufficient information and conflicting requirements;*
- *to demonstrate awareness of the latest principles and methods of environmental protection;*
- *to be able to use up-to-date information resources on ecology, nature management and environmental protection;*
- *to be able to assess landscape and biological diversity and analyze the effects of anthropogenic impact on the environment;*
- *to be able to assess the potential impact of man-made objects and economic activities on the environment;*

- to apply new approaches to develop decision-making strategies in complex unpredictable conditions;
- to assess environmental risks in the conditions of insufficient information and conflicting requirements;
- to choose the optimal management strategy and/or nature management depending on ecological conditions;
- to critically comprehend theories, principles, methods and concepts from various subject areas to solve practical problems and problems of ecology;
- to be able to use modern methods of processing and interpretation of information in innovative activities;
- to be able to independently plan the implementation of an innovative task and formulate conclusions based on its results;
- to know up-to-date approaches to the organization of environmentally cleaner production, reorganization and reconstruction of existing production from the standpoint of resource conservation, taking into account the life cycle of the product;
- to analyze the results of environmental control of companies, assess the engineering and technical level of environmental protection measures against the harmful effects of production;
- using scientific and technical information, regulations, professional knowledge, to apply methods of process control, to manage equipment that protects water bodies, atmosphere, soil and subsoil from pollution and harmful effects;
- based on the regulations of environmental standardization and certification, to work with Ukrainian and foreign standards and certification requirements to develop appropriate professional recommendations;
- to master up-to-date information technology.

2. Prerequisites and post-requisites of the course (the place of the course in the structural and logical scheme of the studies in accordance with educational program)

The Master's thesis is based on the principles of integration of various knowledge acquired by students during the course of Master's studies when studying the disciplines of general and vocational training: "Intellectual Property and Patenting", "Fundamentals of Engineering and Technology of Sustainable Development", "Practical Course in Foreign Language for Business Communication", "Marketing of Start-Up Projects", "Waste Management", "Geographic Information Systems", "Perspective Research Directions in Environmental Protection", "Scientific Work on the Topic of Master's Thesis".

3. Content of the course

The content of the Master's thesis characterizes the originality and uniqueness of the presented information. The basis of the content of the thesis is fundamentally new material, which includes the description of new factors, phenomena and regularities or the generalization of previously known provisions from other scientific positions. The content of the thesis in the most systematized form records both the initial premises of the scientific research and the obtained results. This graduation qualifying thesis of scientific content has an internal unity and reflects the progress and results of the development of the chosen topic. The Master's thesis, on the one hand, has a generalizing character, as it is a kind of summary of the master's training, and on the other hand, it is independent original scientific research of a student.

The content of the Master's thesis includes:

- *formulation of a scientific (scientific and technical) task, definition of the object, subject and purpose of the research, analysis of the status of the solution to the task based on domestic and foreign publications, justification of the research goals;*
- *analysis of possible research methods and methodologies, justified choice (development) of research method(s) or hardware;*
- *scientific analysis and generalization of actual material used in the research process;*

- presentation of the obtained results and assessment of their theoretical, applied or scientific-methodological significance;
- checking the possibilities of practical implementation of the obtained results;
- approbation of the obtained results and conclusions in the form of publications in scientific journals and collected papers, patents (applications) for inventions, utility models, industrial samples, etc., reports at scientific conferences.

The Master's thesis has the following structure:

- title page;
- tasks;
- abstract;
- content;
- a list of conventional designations, symbols, abbreviations and terms;
- sections and subsections of the main part;
- conclusions;
- references;
- appendices (if needed).

The content of each part of the master's thesis is determined by its topic.

4. Coursebooks and teaching resources

Basic literature

1. Order of the Ministry of Education and Science № 40 dated 12.01.2017 "On approval of the Requirements for the preparation of a dissertation".
2. National standard of Ukraine. Information and documentation. Bibliographic reference. General provisions and rules of compilation. DSTU 8302:2015. - K.: SE "UkrNDNC", 2016. - 16 p
3. National standard of Ukraine. Information and documentation. Reports in the field of science and technology. Structure and design rules. DSTU 3008:2015. - K.: SE "UkrNDNC", 2016. - 31 p.
4. National standard of Ukraine. Information and documentation. Bibliographic description. Abbreviations of words and phrases in the Ukrainian language. General requirements and rules. DSTU 3582:2013. - K.: Ministry of Economic Development of Ukraine, 2014. - 18 p.

Additional literature

5. Provisions on the examination board and certification of higher education applicants at Igor Sikorsky KPI. Approved and put into force by Order No. 7/178 dated 01.10.2020, K: Igor Sikorskyi KPI, 2022. – 23 p.

Information resources in the Internet

6. Scientific and Technical Library of the Igor Sikorsky Kyiv Polytechnic Institute / [Electronic resource]. - Access mode: <https://library.kpi.ua>
7. V. I. Vernadskyi National Library of Ukraine / [Electronic resource]. – Access mode: <http://www.nbuv.gov.ua/>
8. Electronic archive of Igor Sikorsky KPI scientific and educational materials / [Electronic resource]. – Access mode: <https://ela.kpi.ua/>

Educational content

5. Methodology

Classroom classes are not included in the plan.

6. Self-study

A master's thesis is an independent research work that performs a qualifying function, is prepared for the purpose of public defense and obtaining an academic Master's degree. The main task of a student

is to demonstrate the level of his/her scientific qualifications, the ability to independently make scientific research and to solve specific scientific tasks.

In the process of preparing and defending the thesis, a student must demonstrate the ability to conduct a systematic analysis of the problem and solve it based on known approaches, to propose new ways to solve the problem (task); the ability to reasonably choose research methods, to modify existing ones and to develop new methods, based on the tasks of a specific study; the ability to apply modern methods of experimental research, methods of experiment planning and processing of its results; the ability to scientifically analyze the obtained results and to develop conclusions and provisions, the ability to defend them with arguments; the ability to assess the possibilities of using the obtained results in scientific and practical activities; mastery of up-to-date information technologies during research and preparation of qualifying work.

No	Name of the topic for self-study	Hours
1	Formulation of the problem, justification of the urgency of a chosen topic <ul style="list-style-type: none"> • selection of methods and substantiation of the topic of scientific research; • patent search and literature review; • substantiation of the purpose and assignment of research tasks on the topic of the master's thesis. 	30
2	Generalization and systematization of new progressive solutions by research topic. Selection and justification of methods for solving research problems. Selection of modern technologies by research topic.	5
3	Definition of the object and subject of research.	5
4	Formulation of the purpose and specific tasks of the research.	5
5	Identification and determination of the scientific novelty of the research. Justification of elements of novelty and usefulness of the results of the Master's thesis.	5
6	Conducting and describing theoretical and experimental research.	250
7	Analysis of research results, comparison with previously known data.	10
8	Formulation of conclusions and evaluation of the obtained results.	5
9	Completion of Master's qualifying work.	40
10	Checking the master's thesis for plagiarism.	5
	Total	360

According to the results of the Master's thesis, at least two articles must be published.

Policy and Assessment

7. Course policy

Policy of deadlines and repeating an examination

In the case of any force majeure circumstances during the execution of the Master's thesis and the impossibility of submitting it for defense, student must contact the teacher through the available (provided by the teacher) communication channels to resolve issues and agree on the algorithm of actions.

Policy of academic integrity

Plagiarism and other forms of dishonest work are unacceptable. Plagiarism refers to the absence of references when using printed and electronic materials, quotes, opinions of other authors. It is not unacceptable to copy 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 Chapter 3 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Details: <https://kpi.ua/code>

Policy of academic behavior and ethics

Students should be tolerant, respect the opinions of others, formulate objections in the correct form, constructively support feedback during classes.

Norms of ethical behavior of students and employees are defined in Chapter 2 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Details: <https://kpi.ua/code>

8. Types of control and rating system for evaluating learning outcomes (RSO)

The master's thesis is the final qualifying work. The form of control is the defense of the thesis.

The system of rating (weight) points and evaluation criteria

No	Characteristics	Weighting coefficient	Evaluation	Result
1	Justification of the purpose of the research, depth of analysis of the state of the solution to the problem	0,1		
2	Justification of the choice of the research method	0,05		
3	The depth of theoretical substantiation of research and modeling of objects	0,15		
4	The level of performance of laboratory experiments	0,3		
5	Scientific novelty of the work	0,2		
6	The quality of the design of the dissertation	0,1		
7	Publication of research results	0,1		
			Total:	

The system of rating points and evaluation criteria:

The weighted score of each thesis evaluation criterion is 100 points.

Completeness and signs of task completion	Score
The task is fully completed	100
Minor errors	80-99
Incomplete answer, major errors	40-79
Poor execution of the task	10-39
Failure to meet the criterion	0

To obtain the final grade, the sum of the received points is translated according to the table:

Score	Grade
95...100	Excellent
85...94	Very good
75...84	Good
65...74	Satisfactory
60...64	Sufficient
RD < 60	Fail
Admission conditions not met	debarred

Syllabus of the course:

Is designed by D.Sc, Associate Professor Oleksandr Khokhotva

Adopted by Department of Ecology and Plant Polymers Technology (protocol № 14 dated 08.06.2022 p.)

Approved by the Methodology Board of the Chemical Engineering Faculty (protocol № 10 dated 24.06.2022)