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

Ecology and technology of plant polymers

SCIENTIFIC WORK ON THE TOPIC OF THE MASTER'S DISSERTATION. PART 1. BASICS OF THE SCIENTIFIC RESEARCH
Working program of the discipline (Syllabus)

Details of the discipline

Level of higher education	***Second (Master's)***
Branch of knowledge	***10 Natural sciences***
Specialty	***101 Ecology***
Educational program	***Ecology safety***
Status of discipline	***Normative***
Form of education	***full-time/remote/mixed***
Year of preparation, semester	***1 course, autumn semester***
Scope of discipline	***2 /(60 hours)***
Semester control/ control measures	***Test***
Schedule of classes	***1,5 hours per week (0,5 hour lectures and 1,0 hour practical clases)***
Language of instruction	***Ukrainian***
Information about thecourse /teachers	***Lecturer: associate professor, Ph.D., associate professor Trembus Iryna Vitalyivna tivkpi@gmail.com Practical: associate professor, Ph.D., associate professor Trembus Iryna Vitalyivna tivkpi@gmail.com***
Course placement	***http://www.eco-paper.kpi.ua/for-student***

Program of discipline

1. Description of the discipline, its purpose, subject of study and learning results

The credit module contributes to the preparation of master's degrees under the educational and professional program "Environmental Safety", belongs to the cycle of professional training and allows to learn the peculiarities of the methodology of conducting scientific research, determine the stages of scientific research work, learn the basics of collecting, processing and analyzing research materials, methods of finding scientific information and working with scientific literature.

The purpose of studying the discipline *is the formation of the students' complex of knowledge, abilities and skills necessary for carrying out scientific and scientific and technical activities, aimed at acquiring and using knowledge for practical purposes.*

The credit module contributes to students' formation of the following ***competencies****:*

- *the ability to learn and master modern knowledge;*
- *the ability to generate new ideas (creativity);*
- *the ability to search, process and analyze information from various sources;*
- *the ability to motivate people and move towards a common goal;*
- *the ability to develop and improve methods and technologies;*

- *the awareness at the level of the latest achievements necessary for research and / or innovation activities in the field of ecology, environmental protection and balanced nature management;*
- *the ability to use the principles, methods and organizational procedures of research and/or innovation activities;*
  *the ability to organize works related to the assessment of the environmental state, environmental protection and optimization of nature management, in conditions of incomplete information and conflicting requirements**;***
- *the ability to self-educate and improve skills based on innovative approaches in the field of ecology, environmental protection and balanced nature management;*
- *the ability to independently develop environmental projects by creatively applying existing and generating new ideas;*
- *the ability to assess the level of negative impact of natural and anthropogenic factors of ecological danger on the environment and people;*
- *the ability to develop a set of management solutions;*
- *the ability to collect and process information in order to obtain parameters characterizing the state of the environment.*

The subject of the discipline *is the methodology and principles of scientific research organization.*

In accordance with the requirements of the educational, professional and educational-scientific program, students after mastering the discipline must demonstrate the ***results of training****:*

- *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 at the level of the latest achievements the basic concepts of natural science, sustainable development and methodology of scientific knowledge;*
- *to demonstrate the ability to organize collective activities and implement complex environmental projects, taking into account available resources and time constraints;*
- *to be able to communicate in a foreign language in scientific, industrial and social spheres of activity;*
- *be able to convey professional knowledge, own justifications and conclusions to specialists and the general public clearly and unambiguously;*
- *know the principles of personnel and resource management, basic 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 modern information resources on issues of 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 a decision-making strategy 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 have the basics of ecological engineering design and environmental expert assessment of the impact on the environment;*
- *to know modern approaches to the organization of environmentally friendly productions, reorganization and reconstruction of existing productions from the standpoint of resource conservation, taking into account the life cycle of the product;*
- *to analyze the results of environmental control of enterprises, evaluate the engineering and technical level of means of environmental protection against the harmful effects of production;*
- *to use scientific and technical information, regulatory documents, professional knowledge, apply methods of managing technological processes, equipment that ensure protection of water bodies, atmosphere, soil and subsoil from pollution and harmful emissions.*

Prerequisitions and requisition of disciplines (place in the structural and logical scheme of training according to the relevant educational program)

The study of the credit module is preceded by the academic disciplines which had been studied in the bachelor's degree. Provides credit module " Scientific work on the topic of the master's theme. Part 1. Basics of the scientific research , execution of a master's thesis.

2. Content of the academic discipline

Section 1. Scientific activity of master's students at universities

Topic 1.1 Organizational structure of research activities

Directions of scientific research activities of students of higher educational institution. Selection of the topic and implementation of scientific research, assessment of the perspective of the topic.

Topic 1.2 Collection, processing and analysis of research materialsя

Work with empirical and scientific and theoretical data. System of sources of scientific information: library funds, archival funds. Work with scientific sources, periodicals. Compiling one's own index of scientific sources.

Topic 1.3 Content and stages of the master's work

Stages of scientific research. A scientific problem. Selection and formulation of a scientific problem. Selection of the research supervisorSelection of the topic and type of research. Definition of hypotheses, goals and objectives of the research. Clarification of the scientific problem and preparation of the initial plan of the scientific work. Program of research. Collection of scientific information. Study of literature and accumulation of materials on the chosen topic.

Section 2. Research conducting. Master's thesis designing and defending.

Topic 2.1 Research conducting

Carrying out research using theoretical and empirical methods. Scientific experiment. Hypotheses proof. Formulation of conclusions and recommendations. Experiment construction. Experiment control. Interpretation of the results of the experiment. Research results generalization.

Topic 2.2 The master's thesis preparation and defense

Statistical analysis of the results of the experiment. Preparation of experimental research results for publication. Preparation of articles, reports, theses. Deposit of manuscripts. Special requirements for

the design of materials of various scientific journals. Presentation of research results in the form of a scientific report. The structure of the GDR report. Requirements for its design.

3. Training materials and resources

Basic

1. Nosachova Yu.V., Ivanenko O.I., Radovenchik Y.V. Fundamentals of scientific research. Kyiv: Condor Publishing House, 2020. – 294 p. 130 p.

2. Kolesnikov O. V. Fundamentals of scientific research. – K.: TSNL, 2019. – 144 p.

3. Anatoliy Konversky. Fundamentals of methodology and organization of scientific research. – K.: TSNL, 2019. – 350 p.

4. Zatserkovny V.I., Tishaev I.V., Demidov V.K. Methodology of scientific research. Education manual Nizhin NSU named after M. Gogol, 2017. 236 p.

Auxiliary (d)

5. Cheryopkina R.I., Movchaniuk O.M. Methodical instructions for the completion and design of a master's thesis. Kyiv "KPI", 2014, - 54 p.

6. Regulations on the master's degree of NTUU "KPI" / Agreement. V.P. Golovenkin In general ed. Yu.I. Yakymenko Kyiv: VPK "Polytechnic" b 2007. - 27 p.

7. Rules for creating links to archival documents in dissertations // Bulletin of the Higher Attestation Commission of Ukraine. – 2010. - No. 3. - P. 17-20.

8. Birta G.O., Methodology and organization of scientific research. Education manual Recommended by the Ministry of Education and Science of Ukraine. K.: Center of Educational Literature, 2016. - 142 p.

9. State standard of Ukraine. DSTU 8302:2015 Information and documentation. Bibliographic reference. General provisions and rules of drafting.

Information resources on the Internet

https://studfile.net/preview/6012352/
http://ukrlit.org/transliteratsiia#source=0jhqu9c+0yjqutc40l3qsa==
Scientometric databases. National Library of Ukraine named after V.I. Vernadskyi - https://www.nbuv.gov.ua

Educational content

4. Methods of mastering the discipline (educational component)

Lectures are aimed at:

- *ensuring in the process of lecturing the creative work of students together with the teacher;*
- *education of students of professional and business qualities and development of their independent creative thinking;*
- *formation of the necessary interest in students and providing direction for independent work;*
- *teaching research materials in a clear and high-quality language in compliance with structural and logical relations, explaining all the newly introduced terms and concepts;*
- *accessibility for perception by this audience.*

№ s/p	The name of the lecture topic and the list of main questions	Number of hours
1	***Scientific activity of master's students in higher educational institutions.*** ***Organizational structure of research activity in a higher educational institution.*** *Directions of scientific research activities of students of higher educational institution. Selection of the topic and implementation of scientific research, assessment of the perspective of the topic.* ***Literature [1, 2, 4, 6].*** ***Tasks on IWS.*** *Organization of scientific research in scientific and educational institutions.*	*2,0*
2	***Collection, processing and analysis of research materials*** *Work with empirical and scientific and theoretical data. System of sources of scientific information: library funds, archival funds. Work with scientific sources, periodicals. Compiling one's own index of scientific sources.* ***Content and stages of the master's work*** *Stages of scientific research. A scientific problem. Selection and formulation of a scientific problem. The research supervisor selection. The topic and type of research selection. Definition of hypotheses, goals and objectives of the research. The scientific problem clarification and preparation of the initial plan of the scientific work. Research program. Scientific information collection. Study of literature and accumulation of materials on the chosen topic.* ***Literature: [1, 2, 4, 9].*** ***Tasks on IWS.*** *Conducting analytical work in the research process. Sources of scientific information.*	*2,0*
3	***Research conducting. Master's thesis designing and defending*** *Carrying out research using theoretical and empirical methods. Scientific experiment. Hypotheses proof. Conclusions formulation and recommendations. Experiment construction. Experiment control. Interpretation of the results of the experiment. Research results generalization..*	*2,0*
	The master's thesis preparation and defense *Statistical analysis of the results of the experiment. Preparation of experimental research results for publication. Preparation of articles, reports, theses. Deposit of manuscripts. Special requirements for the design of materials of various scientific journals. Presentation of research results in the form of a scientific report. The structure of the GDR report. Requirements for its design.*	*2,0*
	Literature: [3, 5, 7, 8]. ***Tasks on IWS.*** *Methods of planning and constructing an experiment.*	
4	***Test***	*1*
	Just	*9*

The main tasks of the cycle of practical classes:

- *to help students systematize, consolidate and deepen knowledge of a theoretical nature in the field of ecology, nature management and environmental protection;*
- *teach students techniques for solving practical problems;*
- *skills and abilities to perform calculations, graphic and other types of tasks;*
- *teach them to work with scientific and reference literature, documentation and diagrams;*
- *to form the ability to learn independently, i.e. to master the methods, methods and techniques of self-learning, self-development and self-control.*

№ s/p	*The name of the practical lesson*	*Number of hours*
1	***Theme 1. Scientometric identifiers of the authors of the publication*** *Impact Factor calculation for relevant scientific publications. Peculiarities of calculating the h-index for evaluating the productivity of scientists.* ***Literature: [1, 2, 3, 5].*** ***Tasks on IWS.*** *Find the scientometric identifiers of the thesis supervisor.*	*4*
2	***Theme 2. Requirements for scientific publications by scientists.*** *The difference between scientific and engineering publications. Necessary sections for scientific articles. Peculiarities of literature review. Requirements for writing the main part of scientific research and conclusions.* ***Literature: [2, 3, 4, 5, 6, 9].*** ***Tasks on IWS.*** *Form the results of research in the form of a scientific article.*	*6*
3	***Theme 3. International scientometric databases Scopus and Web of Science.*** *Citation index. Impact factor. How to find journals in the Scopus database?* ***Literature: [1, 5, 6, 9].*** ***Tasks on IWS.*** *Determine the list of journals in the field of chemical technology and bioengineering.*	*4*
4	***Theme 4. Scientific publications. The concept of academic integrity. The main types of violations of academic integrity.*** *Organizational, legal and technical factors of academic (dis)honesty. Academic Integrity in Research Careers.* ***Literature: [1, 5, 7].*** ***Tasks on IWS.*** *Preparation of theses for publication.*	*4*
	Just	***18***

Independent work of the student

Independent work takes 55% of the time to study the credit module, including preparation for the test. The main task of independent work of students is the mastery of scientific knowledge, which is not included in the list of lecture issues, through personal search for information, the formation of an active interest in the creative approach in educational work.

№ s/p	*Name of the topic submitted for self-study*	*Number of hours of IWS*
Section 1. Scientific activity of master's students in higher educational institutions		

1	*Selection of the topic and implementation of scientific research. Evaluation of the perspective of the topic* ***Literature: [1, 2, 4, 6]***	*8*
Section 2. Research conducting. Master's thesis designing and defending		
2	*The relationship between scientific and everyday knowledge.* ***Literature: [1, 2, 4]**.* *Sources of scientific information.* ***Literature: [7, 8, 9]**.* *Phraseology of scientific prose. Grammatical features of scientific language. Syntax and stylistic features of scientific language.* ***Literature: [5, 6]**.*	*19*
3	***Test***	*6*
	Just	***33***

Politics and control

5. Policy of discipline (educational component)

Rules for attending classes and behavior in classes

Students are obliged to take an active part in the educational process, not to be late for classes and not to miss them without a good reason, not to interfere with the teacher to conduct classes, not to be distracted by actions that are not related to the educational process

Rules for assigning incentive and penalty points

- *incentive points can be awarded by the teacher exclusively for the performance of creative works in the discipline. (But their sum cannot exceed 10% of the rating scale).*
- *penalty points are not provided within the academic discipline.*

Policy of deadlines and rescheduling

In the event of arrears from the academic discipline or any force majeure circumstances, students should contact the teacher through the available (provided by the teacher) communication channels to resolve problematic issues and agree on the algorithm of actions for practice.

Academic Integrity Policy

Plagiarism and other forms of dishonest work are unacceptable. Plagiarism includes the absence of references when using printed and electronic materials, quotes, opinions of other authors. Invalid hints and write-offs when writing tests, conducting classes; passing the credit for another student; copying of materials protected by the copyright system without the permission of the author of the work.

The policies 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". Read more: https://kpi.ua/code

Policy of academic behavior and ethics

Students should be tolerant, respect the opinion of others, object to formulate in the correct form, constructively maintain feedback in the classroom.

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". Read more: https://kpi.ua/code

6. Types of control and rating system for assessing learning outcomes (RCOs)

Distribution of teaching time by types of classes and tasks from the credit module according to the working curriculum

Form teaching	*Semesters*	*Total ak/hour*	*Distribution of teaching time by type of classes*				*Control measures*		
			Lecture	*Practical classes*	*Laboratory work*	*IWS*	*MCW*	*CGW*	*Semester certification*
Day/distress/mixed	*autumn*	*2/60*	*9*	*18*	*-*	*33*	*-*	*–*	*Test*

** - in accordance with the number of students in the group, the number of lecture, practical and laboratory classes can be proportionally changed taking into account individual classes*

The rating of the student from the credit module consists of the points he receives for:

The student's credit module rating is calculated from 100 points that the student receives for

1) *4 practical works execution and defense*
2) *Express control during lectures (2 surveys)*

Semester control is test.

System of rating (weighted) points and evaluation criteria

System of rating points and evaluation criteria:

Practical works (max. 60 points):

For the performance of each practical work you can get

15-14 points – the work is completed in full without errors, the work is correctly designed with appropriate conclusions, the work is submitted for defense in a timely manner, the student shows deep knowledge of the work, confidently and in detail answers the questions asked during the defense;

13-9 points – the work is completed in full with minor errors or inaccuracies, in general the work is correctly designed with relevant conclusions, the work is submitted for defense in a timely manner, during the defense of the work the student shows knowledge of the work, answers the questions with almost certainty;

8-6 points – the work is completed in full with minor errors or inaccuracies with vaguely formulated conclusions, the work is submitted for defense in a timely manner, during the defense the student shows insecurity, shows weak knowledge of work issues, does not always give comprehensive answers to questions.

5-0 points - the work is not completed or not completed in full, the work does not have conclusions or is declarative in nature, during the defense the student cannot answer any question on the topic of the work.

At the beginning of each laboratory work, a control survey is conducted. In case of an unsatisfactory result of the control survey, the student is not allowed to perform laboratory work.

Express control

Express control at lectures is evaluated from 20 points.

"excellent" - complete answer (at least 90% of the required information)	*18-20 points*
"good" - sufficiently complete answer (at least 75% of the required information)	*15-17 points*
"satisfactory" - an incomplete answer (at least 60% of the required information)	*10-14 points*
"unsatisfactory" - the answer does not meet the "satisfactory" requirements	*0-9 points*

Thus, the rating semester scale for the academic discipline is:

R = 60 + 40 = 100 points

Calendar control:

It is held during the 8th and 14th weeks of the semester in order to monitor the implementation of individual study plans by students according to the schedule of the educational process.

The condition for receiving a positive assessment from the calendar control is the value of the student's current rating in the 8th week - 20 points, in the 14th week - 40 points.

A necessary condition for admission to credit is a rating of at least 40% of the rating scale (R), i.e. 40 points and the performance and defense of laboratory work.

In order to receive a credit in the academic discipline "automatic" you need to have a rating of at least 60 points.

Students who have a rating of less than 60 points at the end of the semester, as well as those who want to increase their grade in the ECTS system, perform a credit test. At the same time, points earned during the semester are cancelled. This rating is final. Students give answers to 5 questions during the assessment test.

Each test question (r1, r2, r3, etc.) is valued at 20 points according to the evaluation system:

- *"excellent", complete answer (at least 90% of the required information) - 18...20 points;*
- *"good", sufficiently complete answer (at least 75% of the required information or minor inaccuracies) - 15...17 points;*
- *"satisfactory", incomplete answer (at least 60% of the required information and some errors) - 14...8 points;*
- *"unsatisfactory", an unsatisfactory answer - 0-7 points.*

Maximum number of points 5 x 20 = 100 points

The sum of the points for each of the five questions of the test is converted into a credit score according to the table, and this rating score is final:

Scores	***Rating***
95...100	*excellent*
85...94	*very good*
75...84	*good*
65...74	*satisfactory*
60...64	*enough*
RD < 60	*unsatisfactory*
Admission conditions not met	*not allowed*

7. Additional information on the academic discipline (educational component)

Question for test

1. *Patent search define.*
2. *Give an algorithm for organizing and conducting experimental research.*
3. *Give the method of working with scientific literature.*
4. *Give general concepts about the experiment.*
5. *Describe the use of computer technology for processing the results of scientific research.*
6. *Describe the HID program.*
7. *List the tasks of nurturing creative abilities.*
8. *List the main directions of scientific and technical progress.*
9. *Describe the formal features of a scientist.*
10. *Analyze the use of the Internet to search for professional information.*
11. *Formulate the relevance of the research, its purpose and task.*
12. *Propose an algorithm for compiling a index of scientific sources.*
13. *Describe the relationship between the subject and the method of scientific research.*
14. *Give general concepts about the experiment..*

Work program of the discipline (syllabus):

Compiled *by Associate Professor, Ph.D., Trembus I.V.*

Approved *by the Ecology and technology of plant polymers (protocol No 14 from 08.06.2022)*
Approved by the *CEF Methodical Commission (protocol No.10 of 24.06.2022_)*