



SCIENTIFIC-RESEARCH PRACTICE OF MASTERS OF EDUCATIONAL AND SCIENTIFIC FIELD OF TRAINING

Working program of the academic discipline (Syllabus)

Details of the academic discipline

Level of higher education	Second (master's)
Branch of knowledge	<i>16 Chemical and bioengineering</i>
Specialty	161 Chemical technologies and engineering
Educational program	<i>Industrial ecology and resource-efficient clean technologies</i>
Discipline status	<i>Normative</i>
Form of education	<i>full-time (full-time), part-time (full-time)</i>
Year of training, semester	<i>2nd year of study, 4th semester</i>
Scope of the discipline	<i>9.0 credits (270 hours)</i>
Semester control/ control measures	<i>Test</i>
Lessons schedule	<i>5 weeks, according to the University Order</i>
Language of teaching	<i>Ukrainian</i>
Information about the course leader / teachers	<i>Heads of practice, appointed according to the University Order</i>
Placement of the course	https://do.ipk.kpi.ua/course/view.php?id=4395

Program of educational discipline

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

The subject of the academic discipline. Research practice is one of the important practical disciplines of training specialists in higher education, namely: masters in the educational and scientific direction of training in higher education institutions (HEIs) of Ukraine.

The purpose of the educational discipline.

The purpose of practical training is the student's acquisition of professional skills and the ability to carry out independent research [1]. The essence of practice is to involve graduate students in independent research work, familiarization with the methodology of conducting research work in academic and specialized institutes, leading companies.

The subject of research practice is deepening the skills of independent scientific work, expanding the scientific worldview of students, researching the chosen problem and the ability to connect it with the theoretical direction of research, to determine the structure, logic and content of the future master's work.

1.1 According to the requirements of the educational and professional program, after mastering the credit module "scientific-research practice", students should develop the following competencies:

- the ability to use and adapt theoretical knowledge and practical skills obtained in the course of study to solve scientific and applied research;

- demonstrate knowledge and understanding of basic concepts, principles of implementation of real scientific and applied developments for enterprises, institutions and organizations;
- the ability to research, classify and analyze indicators of the quality of chemical products, technological processes and equipment of chemical production;
- the ability to use the results of scientific research and R&D to improve existing and/or develop new technologies and equipment for chemical industries.

1.2. According to the requirements of the program of the academic discipline, students after mastering it must demonstrate the following program learning outcomes:

- develop and implement projects in the field of chemical technologies and related interdisciplinary projects taking into account social, economic, environmental and legal aspects;
- search for the necessary information in scientific and technical literature, patents, databases, and other sources on chemical technology, processes and equipment for the production of chemical substances and materials based on them, systematize, and analyze and evaluate the relevant information.

2. Pre-requisites and post-requisites of the discipline (place in the structural and logical scheme of training according to the relevant educational program)

The discipline "Scientific-research practice" is planned in the fourth semester of the 2nd year for masters of the National Academy of Sciences in the specialty 161 "Chemical technologies and engineering". The discipline "Scientific-research practice" is based on the principles of integration of various knowledge acquired by students during the bachelor's and the 1st semester of master's studies during the study of engineering and technical disciplines. Discipline "Research practice" is the basis that should provide solving a technical problem and is aimed at a deep rethinking of the existing and creation of new holistic knowledge and professional practice.

3. Content of the academic discipline

Market requirements for the qualification level of masters graduates of technical higher education institutions of Ukraine require the presence of theoretical, applied, technological and other types of competences necessary for the production of goods and services in the conditions of modern high-tech production, fierce competition, limited production resources, risks and uncertainty of market conditions.

Features of educational-scientific and educational-professional master's training programs at polytechnic higher education institutions of Ukraine and leading technical universities of the world, in most cases, combine both scientific-research, technological, and pre-diploma components for preparing master's theses and acquiring professional competencies.

The modern trend of students acquiring knowledge and acquiring skills from all sources and resources available to them will most likely continue to develop, improve and become systemic in the competitive market of educational services. In accordance with the Law of Ukraine on Higher Education, the master's educational and scientific program must necessarily include a research, scientific component of at least 30 percent of the entire content of the master's thesis. Scientific novelty can refer to both theoretical and applied results of scientific research.

Definition 1. Scientific novelty is a properly formalized category of new data, information or knowledge obtained about the subject of research that changes, supplements or improves existing data, information or knowledge about this subject of research. Scientific novelty can refer to both theoretical and applied results of scientific research. Along with scientific novelty, an equally important characteristic of a scientific result is the practical value of the results of scientific research.

Definition 2. Practical value is a measure of evaluation of scientific and technical, economic, socio-political, and other necessary characteristics of usefulness, efficiency, productivity, necessity, etc., of the application of research results. Thus, in the process of forming the work program and individual practice tasks, it is necessary to include scientific, scientific-technical, design, technological and other research components necessary to obtain a scientific result that will have both scientific novelty and practical value.

The modern trend of students acquiring knowledge and acquiring skills from all sources and resources available to them will most likely continue to develop, improve and become systemic in the competitive market of educational services.

To achieve the goal of the discipline "Research practice", students need to complete a certain number of tasks. All practice tasks are grouped into four classes according to the criteria of content and the order of their execution. The performance of each class of tasks ends with a current/calendar control, and the performance of the final fourth class of tasks ends with a semester control (credit).

Task class 1. Clarify and/or form:

1) a statement of the prescribed format in the name of the head of the department with the preliminary title of the MT topic and a request to appoint a scientific supervisor;

2) formalization of MT task statement: object, subject and purpose of research, final result of MT performance;

3) the matrix of entities of the unified model of the "Research practice" system of the master's thesis (MSSP MT);

4) MT template – the first version of MT according to the format and requirements of the Regulation on the state certification of masters of KPI named after Igor Sikorskyi [2] with the prescribed structure, tasks for the MT and completed first section of the MT with the previous title "Overview of existing solutions on the topic of MT", and other sections. Current control/calendar control No. 1 of practice - according to the results of the execution and content of documents for the class of tasks 1.

Task class 2. Approve, protect and prepare:

1) to approve the final topic, formalization of the statement of the problem and MT tasks;

2) create and protect the first version of the MT template with all sections completed;

3) prepare a draft abstract of a report at a scientific conference (or an article to be published in a professional publication of Ukraine). Current control/calendar control No. 2 of practice - based on the results of tasks and the content of documents for task class 2.

Task class 3. To issue the results of practice:

1) submit abstracts of reports/articles with all accompanying documents to the organizing committee of the conference/editor of the scientific publication;

2) formalize scientific novelty, practical value and conclusions based on the results of scientific research on the topic of MT;

3) prepare a presentation of practice results for practice credit;

4) deliver a report at a scientific-practical conference determined by the master's student and the supervisor. Current control/calendar control No. 3 of practice - based on the results of tasks and the content of documents for task class 3.

Task class 4. Prepare and submit to the commission and defend a practice report:

1) submit a final statement on the subject of MT, a practice diary, a practice report, a presentation of a practice report to the commission for accepting practice results;

2) protect practice results;

3) familiarize yourself with the procedure for preliminary protection of MT. Semester control (credit) of practice - based on the results of the practice report, the performance of tasks and the content of documents for class 4 tasks.

The individual task is developed by the student in cooperation with the head of the MT and the head of the base enterprise, then it is agreed with the head of practice. The content of the individual task is consistent with the topic of the master's thesis. Together with the individual task, the student forms a calendar plan for the internship. The performance of an individual task is monitored by the head of practice from the department, the scientific supervisor of the MT and the representative of the practice base according to the calendar plan.

Practice schedule:

The total duration of practice is 8 weeks.

Approximate distribution of practice duration:

No	Content	Deadline	Performance Note
1	Submit an application of the established sample at the name of the head of the department with the previous one with the name of the MT topic and a request to appoint a scientific supervisor.		
2	Complete the formalization of the formulation of the MT task: the object, subject and goal of the research, the final result of the MT implementation.		
3	To form a matrix of entities of the unified model of the system "Research practice" of the master's thesis (MSSP MT).		
4	Prepare the MT template - the first version of the MT.		
5	Approve the final topic, formalization of the problem statement and MT tasks.		
6	Create and protect the first version of the MT template with all sections completed.		
7	Prepare a draft abstract of a report at a scientific conference (or an article for Publication in a professional publication of Ukraine).		

8	Submit to the organizing committee conferences/editions of a scientific specialist edition of the abstract of a report/article, for example, to the conference "Resource-energy-saving technologies and equipment", with all accompanying documents.		
9	To formalize scientific novelty, practical value and conclusions regarding the results of scientific research on the topic of MT;		
10	Prepare a presentation of the results of the practice for credit from the practice.		
11	Give a speech at a scientific-practical conference determined by the master's student and the academic supervisor.		
12	Submit the final statement on the topic of MT, practice diary, practice report, presentation of the practice report to the commission for accepting practice results.		
thirteen	Protect the results of practice.		
14	Familiarize yourself with the order of preliminary protection of MT.		

4. Educational materials and resources

1. Regulations on the organization of the educational process at Igor Sikorskyi KPI: approved by the order of the Rector, ORDER No. 7-124 dated 07/20/2020. [Electronic resource] . - Access mode - <https://document.kpi.ua/regulations>. - Title from the screen. - Ukrainian language.

2. The regulation on the procedure for the practice of higher education applicants of the National Technical University of Ukraine "Ihor Sikorskyi Kyiv Polytechnic Institute" 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. - Title from the screen. - Ukrainian language.

3. Methodological recommendations on issues of organization of students' practice and drawing up work programs of practice of the National Technical University of Ukraine "Ihor Sikorskyi Kyiv Polytechnic Institute" [Text] / Composer: N.M. Lapenko, I.L. Spivak, I.V. Fedorenko, O.M. Shapovalova; in general ed. P.M. Yablonsky. - K.: KPI named after Igor Sikorskyi, 2018. – 29 p.

4. Primakov S.P., Barbash V.A. Technology of paper and cardboard. - K.: ECMO, 2002. - 396 p.

Educational content

5. Methods of mastering an educational discipline (educational component)

ORGANIZATION, CONDUCT AND MANAGEMENT OF PRACTICE

Research practice can take place at an enterprise, organization or educational institution. On the part of the university, practice management is carried out by the teacher of the department responsible for the practice, the head of the graduation qualification work, on the part of the company - a manager from among specialists according to the profile of the specialty.

The head of practice from the department ensures the implementation of all organizational measures before the start of practice: briefing on the procedure for passing practice; provision of necessary documents to intern students: referral to practice, practice diary.

The thesis supervisor provides advice on issues related to writing a master's thesis.

The research practice begins with mandatory safety training for all students at the enterprise and workplaces, familiarization with the rules of the internal procedure.

Regulations on the practice of higher education applicants of KPI named after Igor Sikorskyi (Order No. 7-172 dated 09/24/2020 regulates the duties of the head of practice and the student.

The head of practice from the department must [1-3]:

- develop work programs of practice and coordinate them with practice databases no later than two weeks before the start of practice;

- warn students about issuing a medical certificate about their health (if necessary) 7 days before the start of practice;

- no later than 7 days before the start of practice, provide the practice bases with lists of student-interns for issuing temporary passes;

- prepare to provide a student or a group of students with a referral for practice;

- when two or more students are sent for practice, appoint the senior group, who is the assistant to the head of the practice;

- hold meetings with students and acquaint them with work practice programs;

- issue diaries to students with individual tasks and a calendar plan for practice;

- ensure the timely arrival of students at practice bases and monitor the completion of practice;

- systematically, at least once a week, advise students and monitor the stages of individual task performance according to the calendar plan;

- to help the head of practice from the enterprise in drawing up the characteristics of each student;

- to take part in accepted credits from practice;

- check the return of passes, literature and property to the enterprise by all students;

- draw up a logbook of going to work, as well as conduct a briefing on safety techniques, if students are doing internships in structural units of the university;

- submit to the dean's office a report on the results of practice with suggestions for its improvement.

Students of the university during internship are obliged [1-3]:

- before the beginning of practice, receive from the head of practice at the department referrals for practice, work program of practice and practice diary;

- arrive at the practice base on time;

- to fully perform all the tasks provided for by the internship work program and the instructions of its supervisors;

- to know and strictly adhere to the rules of labor protection, safety and industrial sanitation and internal regulations of the enterprise;

- to be responsible for the work done;

- to issue a report in a timely manner and make a credit from practice.

Practice diary

The main document, according to which the internship is monitored, is the internship diary issued by the department. The diary contains an individual task, a practice calendar, and weekly entries.

Practice managers from the department and the practice base check the diary every week and write down their comments. The supervisor of the master's thesis supervises the implementation of the individual task. After the end of the practice period, the supervisor from the practice base provides feedback on the student's internship in the diary and evaluates its results with a grade, the supervisor of the master's thesis writes a feedback on the state of the master's thesis in the diary.

6. Independent work of the student

During the internship, the student must complete the following amount of work:

1. Definition of the object and subject of research taking into account the practice base (enterprise/institution).

2. Forming the content of the individual task together with the scientific director of the MT.

3. Determination of the terms and scope of the necessary theoretical studies and calculations.

4. Collection and systematization of information about the object of research.

5. Description of the research object model.
6. Evaluation of relationships between model elements.
7. Clarification of the topic of MT. Formulation of the statement of the problem for writing a master's thesis theses.
8. Analysis and selection of methods and technologies for the implementation of the given task.
9. Forming a practice report.

Policy and control

7. Policy of academic discipline (educational component)

Practice report requirements

At the end of the practice, students must submit a written report together with the diary to the head of the practice from the department within the set deadline (no later than three days after the end of the practice) for inspection, review and admission to the defense. The written review of the head of practice from the department and the scientific supervisor of MT are entered in the student's diary.

The internship report must contain information about the student's implementation of the internship program and individual assignment. Systematization of the collected materials is carried out by the student during practice and is completed during the time specially allocated for this purpose, in accordance with the practice program.

The structure and content of the practice report sections

The practice report consists of the following sections or documents:

1. Title page of the report (according to the sample).
2. Contents of the practice report.
3. Introduction, with a brief overview of the problem area for which MT is performed, a brief argumentation of the relevance of the declared research, a brief summary of the sections of the report.
4. Formalization of MT task statement (object, subject and purpose of research, final result of MT performance).
5. The first full version of MT with all sections and appendices completed. MT consists of the following elements:
 - Title page of the established sample;
 - Tasks for the master's thesis" of the established model;
 - Abstract (in Ukrainian);
 - Abstract (abstract in English);
 - Content;
 - List of conventional designations, abbreviations and terms;
 - Introduction;
 - The main part with a list of sections;
 - Conclusions;
 - References;
 - Appendix A to the MT - Presentation of the first full version of the MT with all sections completed (individual slides have not yet been developed).
 - Appendix B to MT - Draft article (thesis) of a report at a selected conference or other publication on the topic of MT published (submitted and/or accepted for publication) in a professional publication.

6. Conclusions to the report.

Summary of practice

The report is defended by the student at the commission [3] appointed by the head of the department. The committee consists of practice supervisors from the department, supervisors of master's theses. The commission accepts credit within the first ten days after the end of the internship.

In order to be admitted to the practice credit, the student must present the commissions (no later than three days before the end of the practice) for verification and review:

- 1) practice report;
- 2) presentation of the practice report;

3) practice diary.

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

Current control: checking the practice diary every week

Calendar control: checking the performance of four classes of tasks according to the calendar plan.

Semester control: defense of the practice report, credit.

Terms of admission to semester control: a minimum positive assessment for the performance of an individual task, a minimum rating of 60 points.

Evaluation criteria:

1) Availability of documents: practice report; presentations of practice reports; practice diary - 60 points.

2) Protection of the practice report and performance of the individual practice task

Evaluation criteria:

1) complete completion of an individual task - 40 points;

2) incomplete completion of an individual task – 10-20 points;

3) sufficient correspondence of the content of the individual task – 0 - 5 points.

Table of correspondence of rating points to grades on the university scale:

R	University scale
95...100 points	Perfectly
85...94 points	Very good
75...84 points	Fine
65...74 points	Satisfactorily
60...64 points	Enough
R<60 points	Unsatisfactorily
Admission conditions not met	Not allowed

Working program of the academic discipline (syllabus):

Compiled associate professor, Ph.D., Ploskonos V.G.

Approved department ___E and TRP___ (protocol No. 14 dated 08.06.2022)

Agreed by the IHF Methodical Commission (protocol No. 10 dated 06.24.2022)