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« NATIONAL MINING UNIVERSITY »**

**Chair of Philosophy and Pedagogy**



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**WORKING PROGRAM OF EDUCATIONAL DISCIPLINE  
« PHILOSOPHICAL PROBLEMS OF SCIENTIFIC RESEARCH »  
for masters of all specialties**

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## **1. Introduction**

The program of normative discipline "Philosophical problems of scientific researches" specifies higher education program to prepare masters of all directions.

The discipline program is an integral part of a system of higher education standards.

Aim of the course is to develop the knowledge of masters in the field of philosophy and methodology of science, acquaintance of masters with the practical application of scientific and methodological knowledge in professional activities.

Course "Philosophical problems of scientific research" is read in accordance with the main positions in the history of philosophy and modern philosophy. The course raises the most important philosophical problems of science, as well as methodological schools and directions.

In order to construct the course basic historical-philosophical and systematic approaches were selected. It allows to identify and compare key phenomena in the development of the philosophy of science and methodology. The course is closely linked with the ideas of knowledge synthesis, carried out through the extension of research in subject fields, as well as through the establishing of methodological technologies that are capable to play a role in infrastructures of cognitive activity within all areas. The course presumes a combination of historical-philosophical, systemic and logical approaches, while in its final sections - the use of philosophy and methodology in the process of solving research tasks in the areas of natural, technical, and social and humanitarian disciplines.

The course has taken into consideration all of the changes that have taken place in intellectual culture at the turn of the 20<sup>th</sup> - 21<sup>st</sup> centuries. They are related to the more active and direct involvement of man in information and technological processes, which changes a number of stereotypes of philosophers and scientists.

Thus, in process of learning the course, students will have the opportunity to get acquainted with the history of the interaction of philosophy and science, acquire the skills of the expression and systematization of cognitive methods, develop the ability to work with the categorical apparatus of philosophy, as well as any other field of knowledge, bringing them to the ranks of research instruments.

The course is closely linked with the development of modern science. Materials are prepared with the idea of interconnected cycles. This includes:

- a manifestation of certain change in a specific discipline or a range of disciplines;

- reaction to the current change from the side of philosophy, including the appearance of its special philosophical interpretation, or even in relation to independent philosophical ideas (associated with the initial event as a "momentum");
- the manifestation, typology and analysis of existent in the research activity as well as the prediction of the possible consequences of their application for the solution of new cognitive tasks.

Having studied the discipline "Philosophical problems of scientific research" the student must know:

- the main theoretical positions of the philosophy of science, have the concept of the subject, methods, tasks of the philosophy of science;
- history of the interaction of philosophy and science as well as the role of the philosophy of science in modern life;
- specifics of natural and humanitarian knowledge, including in specific disciplines and methods used;
- modern theories of scientific knowledge development;
- understand the nature of the crises of sciences that arise periodically, and the need for the adoption of new paradigms in scientific knowledge.

The student must be able to:

- reconstruct cognitive methods, categorical schemes;
- work with scientific materials in the direction of their generalization and philosophical interpretation;
- work with the categorical apparatus of philosophy, as well as any other field of knowledge, bringing them to the ranks of research tools.

***Contraction used in the standard:***

EQC - educational qualification characteristic;

EPP - educational-professional program;

IHE – institution of higher education;

NMU – National Mining University;

ECTS – European Credit Transfer System;

CQT – complex qualification tasks.

## **2. Field of use**

***The work program extends to the department, which is charged with teaching the discipline by order of the rector.***

***The work program is designed for:***

- the implementation of a competent approach in shaping the structure and content of discipline;
- definition of the information base for the creation of diagnostic tools;
- internal and external quality control of specialist preparation;
- accreditation of educational program in specialty.

***The work program is set to:***

- form of final control;
- basic discipline and discipline provided;
- designation of physical quantities;
- discipline study results and its' level of difficulty;
- thematic plan and volume distribution by types of educational activities;
- structure and content requirements of the course project;
- individual work task for the applicant;
- diagnostic tools requirements, methods and criteria for evaluating academic achievements;
- requirements for the complex of teaching and methodological support of the discipline;
- the main thesaurus of discipline.

### **3. Normative references**

The work program of the discipline is developed on the basis of such normative documents:

1. Law of Ukraine from 01/07/2015 №1556-VII "About Higher Education"
2. Ukraine Cabinet of Ministers Resolution from December 30, 2015 № 1187 Licensing conditions for the educational activities of educational institutions (Ukraine CM Resolution from December 30, 2015 № 1187 "Licensing conditions for the educational activities of educational institutions").

### **4. The volume of discipline**

Total amount - 3 credits ECTS (90 academic hours).

### **5. Finals**

Test is based on the results of current control as well as the performance of complex control work (if necessary).

## 6. Base disciplines and disciplines provided

Philosophy

Logic

Psychology

## 7. Study results by discipline

<b>The code and the content of educational outcomes for an educational-professional program</b>	<b>The code and the content of study results by discipline</b>
<b>1.</b> Understand and characterize the philosophy of science.	PH <sub>ФПНД</sub> 1. To form the concept of science, goal, object and philosophy of science subject.
<b>2.</b> To form an understanding of epistemological prerequisites and peculiarities of scientific knowledge, to be able to distinguish and to define the empirical and theoretical aspects of science.	PH <sub>ФПНД</sub> 2. Understand epistemological prerequisites and peculiarities of scientific knowledge, determine the empirical and theoretical aspects of science.
<b>3.</b> Understand and characterize the structural features of science.	PH <sub>ФПНД</sub> 3. To define and characterize the structure of science, to classify scientific methods.
<b>4.</b> To define the concept of scientific truth, to carry out the distribution and classification of the main theories of truth.	PH <sub>ФПНД</sub> 4. To define the concept of "truth" and to classify the basic theories of truth in modern science methodology.
<b>5.</b> Understand and characterize the essence of technology and its relation to scientific cognition.	PH <sub>ФПНД</sub> 5. Determine the essence of technical progress and its relationship with science.
<b>6.</b> Understand and characterize the socio-ethical problems of modern science, determine the relationship between science and society.	PH <sub>ФПНД</sub> 6. Identify the main stages and problems of interaction between science and society.

<b>The code and the content of educational outcomes for an educational-professional program</b>	<b>The code and the content of study results by discipline</b>
<b>7.</b> To form the notion about the origin and development of science in the ancient world, to understand the main tendencies of the development in ancient science.	PH <sub>ФПНД</sub> 7. To substantiate the philosophical and methodological contribution of the philosophy of the ancient world to the development of science.
<b>8.</b> To define and characterize the main tendencies of the development of European science and philosophy of the Middle Ages and the Renaissance.	PH <sub>ФПНД</sub> 8. Identify the philosophical and methodological achievements of the Middle Ages and the Renaissance
<b>9.</b> To form an idea about the origin and development of the philosophy of science in modern period and the methodological developments of the nineteenth-century philosophy.	PH <sub>ФПНД</sub> 9. To formulate the principles of the methodology of empiricism, rationalism, skepticism, to reveal the notion about knowledge methodology of German idealism.

**8. Plan and volume distribution by types of educational activity  
(for the group 124М-17-1)**

<b>Types, subjects of educational activities, ciphers of disciplinary learning results</b>	<b>Volume, hours</b>		
	<b>lecture hall</b>	<b>CPC</b>	<b>overall</b>
<b>Lectures</b>			
<b>PH<sub>ФПНД</sub>1. To formulate the concept of science, purpose, object and subject of the philosophy of science.</b>	2	4	6
1.1. Anthropological essence of science. Purpose, object and subject of the philosophy of science.			
1.2. Interaction of philosophy and science, science and everyday knowledge of human.			
1.3. Science and mythology. Science and art. Science and religion.			



Types, subjects of educational activities, ciphers of disciplinary learning results	Volume, hours		
	lecture hall	CPC	overall
1.4. Reproduce the base elements of scientific knowledge.			
1.5. Describe the differences between science and art, science and religion, science and mythology, science and philosophy.			
<b>PH<sub>ФПНД</sub>2. Understand epistemological prerequisites and peculiarities of scientific knowledge, determine the empirical and theoretical aspects of science.</b>	2	4	6
2.1. The concept of methodology and the influence of philosophical methodology on scientific knowledge.			
2.2. Empirical level of scientific knowledge.			
2.3. Concept meaning of "scientific fact".			
2.4. The concept and structure of scientific theory.			
<b>PH<sub>ФПНД</sub>3. To define and characterize the structure of science and classify scientific methods.</b>	2	4	6
3.1. Structural features of science and scientific knowledge.			
3.2. Concept of scientific method and classification of scientific methods.			
3.3. Concept of cognitive procedure. The notion of measuring in science.			
<b>PH<sub>ФПНД</sub>4. To define the concept of "truth" and to classify the base theories of truth in modern science methodology.</b>	2	4	6
4.1. The concept of truth in science and philosophy. The history of the formation of the concept of truth in philosophy and science.			
4.2. Coherent and pragmatic theories of truth.			

Types, subjects of educational activities, ciphers of disciplinary learning results	Volume, hours		
	lecture hall	CPC	overall
4.3. Relativistic Approaches to Defining Truth.			
<b>PH<sub>ФПНД</sub>5. Determine the essence of technical progress and its relationship with science.</b>	2	4	6
5.1. The concept of technology. Historical and social significance of technical progress.			
5.2. The relation between technology and science and the main aspects of their interaction.			
5.3. Features of technical development in the modern world.			
5.4. Dangers of uncontrolled technical development.			
<b>PH<sub>ФПНД</sub>6. Identify the main stages and problems of interaction between science and society.</b>	2	4	6
6.1. Ethical and social problems of modern science.			
6.2. Prospects for the development of science, basic approaches to the development of science.			
6.3. Science as an anthropological factor. Problems and critique of transhumanism.			
<b>PH<sub>ФПНД</sub>7. To substantiate the philosophical-methodological contribution of the philosophy of the ancient world to the development of science.</b>	2	4	6
7.1. Science characteristics of the Ancient East.			
7.2. Theories of ancient Greek philosophers and their role in the formation of scientific knowledge.			
7.3. Educational Achievements of Antiquity: School and Academy.			
<b>PH<sub>ФПНД</sub>8. Identify the philosophical-methodological achievements of the Middle Ages and the Renaissance</b>	2	4	6
8.1. The Meaning of Realism and Nominalism in Medieval Philosophy.			
8.2. Renaissance's main trends of the science.			
8.3. Features of the Galilei's experimental method.			

Types, subjects of educational activities, ciphers of disciplinary learning results	Volume, hours		
	lecture hall	CPC	overall
<b>PH<sub>ФПНД</sub>9. To formulate the principles of the methodology of empiricism, rationalism, skepticism, to reveal the notion of the German idealism methodology.</b>	2	4	6
9.1. Empiricism and rationalism in the European philosophy and science of modern times.			
9.2. Principles of argumentation of skepticism.			
9.3. I. Kant’s theory of knowledge and achievements of German idealism in theory of knowledge.			
<b>SEMINAR CLASSES</b>			
<b>PH<sub>ФПНД</sub> 1. Identify and formulate science, scientific knowledge and its features.</b> <b>PH<sub>ФПНД</sub> 2. Be able to distinguish clearly between varieties of social consciousness: science, philosophy, mythology and religion.</b> <b>PH<sub>ФПНД</sub> 3. Understand and define the peculiarities of the general construction of scientific knowledge.</b> <b>PH<sub>ФПНД</sub> 4. To characterize the social aspects of science, to identify the ethical problems of modern science.</b> <b>PH<sub>ФПНД</sub> 5. To characterize and describe modern theories of science, be able to distinguish between the theories of truth, which ones are working in modern science.</b>	9	27	36
Seminar 1. PHENOMENON OF SCIENCE. PECULIARITIES OF SCIENTIFIC KNOWLEDGE. Seminar 2. SCIENCE, PHILOSOPHY, MYPHOLOGY, RELIGION - ASPECTS OF INTERACTION. Seminar 3. STRUCTURE OF SCIENCE. FEATURES OF THE SCIENTIFIC METHOD. Seminar 4. SCIENCE AS A SOCIAL INSTITUTE. SOCIAL AND ETHICAL ASPECTS OF SCIENCE AND SCIENTIFIC COGNITION. Seminar 5. MODERN PHILOSOPHICAL THEORIES OF SCIENCE. THE PROBLEM OF TRUTH.			
<b>OVERALL</b>	<b>27</b>	<b>63</b>	<b>90</b>

Types, subjects of educational activities, ciphers of disciplinary learning results	Volume, hours		
	lecture hall	CPC	overall
<b>Lectures</b>	18	36	54
<b>Seminar classes</b>	9	27	36

## 9. Requirements for individual tasks

9.1. Individual task « Essay on the subject of programmatic learning results» is aimed at:

- ♦ to raise the conceptual and analytical level of knowledge;
- ♦ to form a general cultural awareness of students;
- ♦ to educate in them the ability to independently analyze various socio-political and cultural phenomena of the present, to express their attitude towards them;
- ♦ to master methods of conducting a substantiated polemic;
- ♦ to develop a creative approach to the classification, systematization and synthesis of scientific information;
- ♦ to master the technique of public speaking (report), sources of information analytical review results.

9.2. The essays should reflect the consideration of the main programmatic learning results. The essay preparation task envisages the analysis and generalization of information sources, recommended for covering the chosen topic, comparing the different views on the problem of different authors, forming their own point of view.

9.3. Defense of an essay happens during the presentation of its main provisions at a seminar or during an interview with a teacher.

9.4. The department is responsible for organizing the preparation of essays, which is obliged to create appropriate conditions for this, provide the necessary methodological and informational support.

## 10. Task for the individual work of the applicant

The main tasks for independent work:

- 1) preliminary processing of information support for each module (topic);
- 2) preparation for the current control - solving tasks of self-control for each topic;
- 3) execution of an individual task;
- 4) preparation for the protection of an individual task;
- 5) preparation for final control.

## 11. Requirements for diagnostic tools, methods and criteria for evaluating academic achievements

11.1. Requirements for diagnostic tools

An information base for the development of diagnostic tools (open or closed tests) should be the system of competencies provided by this program.

The test consists of a task and a standard. The standard is a model of a complete and correct solution.

The test parameters are the degree of complexity and the number of essential operations.

The degree of complexity of the test should correspond to the expected learning outcomes that the applicant must demonstrate by certain actions during the control activities (reproduce, describe, mark, name, depict, assimilate the essence, understand the content, distinguish, compare, identify, select, prove, deliberately use, change to solve, find, explain, count, analyze, differentiate, cover, separate, contradict, synthesize, compile, develop, formulate, plan, generate, evaluate, identify, interpret, criticize, predict).

The number of essential operations is the number of actions that are of fundamental importance to obtain the correct result (steps of the implementation algorithm, flowcharts, concepts definition, parameters and their use). The calculation of essential transactions number is conducted in accordance with the standard.

Standards for tasks can be fragments of educational, scientific and technical literature and other sources. In this case, it is necessary to submit a list of exact references to the relevant sources (bibliographic description of the publication, coordinates of the reference - a link to the page, paragraph).

The complete set of tests with full description (task and standard) for all disciplinary competencies is approved by the department and is part of the documentation of methodological support.

To ensure the transparency of diagnostic tools' content, generalized tasks should be made available to students throughout all of the studying period.

#### 11.2. Criteria and procedures for assessing the achievements of applicants

Results objective evaluation of the tasks done is possible (as well as any other measurement) only when compared with the standards.

Operational comparison of answers with the standard allows to objectively determine the quality of tasks from the position of achievement level, that is, the proportion of correctly executed essential operations to their total.

The process of evaluation is greatly simplified, if for the number of essential operations, only the steps of the task execution algorithm are taken.

For diagnostics reliability, the number of essential operations in the standards should be at least 30. The contents of the standards should correspond to the program of discipline regarding the complexity degree of educational competences.

#### 11.3. Evaluation of the study results in discipline

The results of learning are determined by defining the level of competence generation, which serves as criteria for evaluation according by the scheme of the addition to the European standard diploma:

#### ***Scales for assessing academic achievement for higher education graduates***

Рівень досягнень / Marks, %	Оцінка / Grade
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National Differentiated Scale	
90 – 100	Відмінно / Excellent
74 – 89	Добре / Good
60 – 73	Задовільно / Satisfactory
1 – 59	Незадовільно / Fail
Scale ECTS	
90 – 100	A
82 – 89	B
74 – 81	C
64 – 73	D
60 – 63	E
35 – 59	Fx
1 – 34	F

Formation level of the applicant's learning results is determined on the basis of an analysis of the answer using the formula:

$$P_i = a / m, \%,$$

where is  $a$  – the number of correct answers or essential operations performed on the basis of the decision standard;

$m$  – the total number of questions or significant transactions in the decision standard.

The integral level of student achievement in mastering discipline material as a whole is calculated as the weighted average value of achievements demonstrated during each control activity:

$$IP = \sum_{i=1}^n (P_i \times T_i) / T, \%,$$

where is  $n$  – number of content modules;

$P_i$  – the level of achievements for the  $i$ -th module, %;

$T_i$  – the volume of the  $i$ -th module, including an individual task;

$T$  – total volume of discipline.

## 12. Requirements for the complex of teaching and methodological support of the academic discipline

The complex of teaching and methodological discipline provision, should be located on the site of the Department of Philosophy and Pedagogy and should contain [2]:

- 1) work program of discipline;
- 2) educational content (information provision of lectures);

- 3) methodical provision of seminars;
- 4) materials for methodological support of independent work of the student, concerning:
  - 4.1) preliminary processing of information support for each module (topic);
  - 4.2) solving self-control tasks for each topic;
  - 4.3) performance of an individual task;
  - 4.4) preparation for the protection of individual tasks;
  - 4.5) preparation for final control;
- 5) tasks for the current and final control of the level of the formation of disciplinary competencies;
- 6) tasks for integrated control work;
- 7) task for post-certification monitoring of the level of formation of disciplinary competencies.

### **13. Mandatory Thesaurus**

*Accreditation* – is a procedure for confirming the capacity of a higher educational institution to carry out educational activities related to the acquisition of higher education in a certain specialty of the relevant educational qualification, educational and scientific levels in accordance with the requirements of higher education standards, as well as requirements regarding personnel, scientific, methodological and material- technical support;

*Standard solution* – is a sample of the correct solution to the test task;

*European Credit Transfer System* – a set of organizational and methodological measures based on a combination of modular teaching technologies and graduation units (credit credits);

*Student's task for a control event* – a task that is formed from the specified tasks of the tests;

*Diagnostic tools* – documents approved in accordance with the established procedure and intended to determine student's planned level of formation of achievement degree competencies during control activities;

*Content module* – a set of educational elements that ensure the implementation of competence;

*Integrated assessment* – the evaluation result of concrete tasks on different levels, taking into account the priority coefficient (the planned level of formation of competencies);

*Informational support of the discipline* – ways of studying, which systematically sets out the basics of knowledge on a certain discipline at the level of contemporary achievements of science and culture, support for self-education (textbooks, teaching aids, textbooks, dictionaries, encyclopedias, reference books, etc.);

*Essential operation* – step of algorithm solution, calculation scheme, definition of concepts, parameters and actions on them, etc.;

*Assimilation rate* – the ratio of correctly executed essential operations to their total number;

*Priority factor of the test task* – planned level of formation of competencies;

*Competence* – specialist's range of powers (functions, tasks and their components - relevant skills);

*Specific task* – tasks containing numerical or other concretization of output data in accordance with the generalized tasks;

*Criteria for assessing the quality of training* – algorithm for estimating the national and ECTS scales;

*Licensing* – a procedure for recognizing the capacity of a higher educational institution or other legal entity to carry out educational activities related to the provision of higher education of certain educational qualification, educational and scientific levels, postgraduate education, other educational services in accordance with the requirements of higher education standards, as well as requirements for personnel, scientific-methodical and logistical support;

*Methodical provision of educational discipline* – recommendations for the support of the student's educational activity in all types of studying sessions, including information on the means and procedure of control measures, their form and content, methods for solving exercises, sources of information;

*Modular control* – assessment of the level of achievement by the student of the planned level of derivative competences by type of training sessions;

*Academic discipline* – totality of modules to be subject to final control;

*Educational element* – minimal educational information of independent semantic value (concepts, phenomena, relations, algorithms);

*Educational objectives of discipline* – planned derivative competencies;

*Object of diagnostics* – Derivatives from the EQC competencies provided by the discipline;

*Assessment of the test task* – the result of evaluation using the coefficient of assimilation;

*Final control* – complex assessment of achievement level by the student of the planned level of discipline competences derivatives;

*Current control* – assessment of the student's learning of the material during the classroom sessions (for example, student surveys at lectures, checking and receiving reports on laboratory work, testing, etc.);

*Derivative competencies* – detailed competencies as a result of the decomposition of the main competence of the specialist for EQC;

*Discipline program* – a normative document defining the content of the discipline in accordance with EPP, is developed by the department, which is fixed by



the order of the rector for teaching discipline, and operates during the period of implementation EPP;

*Study results* – knowledge, understanding, skills, other personal qualities that a person acquired after completing a course in a certain educational-professional program;

*Level of competencies formation* – activity characterized by goals, initial data, methods of activity, novelty of the results;

*Work program of discipline* – a normative document developed on the basis of the discipline program in accordance with the annual curriculum (contains a breakdown of the total time for assimilating separate educational elements and modules by type of training sessions);

*Independent work* – activity of a student on the study of educational elements and content modules, mastering of planned competencies, performance of individual tasks, preparation for control activities;

*Test* – a form of a diagnostic tool, consisting of a task and a standard. The task contains the problem statement, the standard is a sample of the complete and correct solution of the problem, the test parameters - the test level, the number of essential operations, the coefficient of assimilation;

*Generalized task* – the task without specifying the source data, which is formed in order to provide transparency to the way of diagnosis and brought to the attention of students at the beginning of teaching discipline;

*Forms of diagnostics of the level of formation of competencies* – current control, module control, final control;

*Quality of higher education* – the level of knowledge, skills and experience gained by a person, reflecting professional competence in accordance with higher education standards;

*Quality of educational activity* – a set of activity characteristics of a higher educational institution, another legal entity providing educational services aimed at ensuring the acquisition of a person of quality education in accordance with the standards of higher education.

#### **14. Recommended literature**

- 14.1. DSTU 3008-95 State standard of Ukraine. Documentation. Reports in the field of science and technology structure and rules of registration.
- 14.2. Kuhn T. Structure of scientific revolutions. – M.: AST, 2002. – 608 p.
- 14.3. Lakatos I. Methodology of research programs. - St. Petersburg., 2000.
- 14.4. Nikiforov A.L. Philosophy and history of science. - M.: Idea-Press, 2008.– 176 p.
- 14.5. Fundamentals of the philosophy of science. Textbook / Ed. S.A. Lebedev. - Ekaterinburg: Business book, 2005. – 780 p.
- 14.6. Feyerabend P. Selected works on the methodology of science. - M.: Progress, 1986. – 542 p.

Educational edition

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