(Ф 03.02 – 110)

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL AVIATION UNIVERSITY
Faculty of Linguistics and Social Communications
Department of Philosophy

APPROVED
Vice-Rector for Academics

_____ Anatolii POLUKHIN
«13» 09 2022

Quality Management System

COURSE TRAINING PROGRAM
on
"Philosophical Problems of Scientific Cognition"

For all Fields of Study, Specialties and Educational and Professional programs

Form of study	Sem.	Total (hours / ECTS Credits)	Lectures	Practicals	Self-study	HW / CGP / C	Tests	Form of Semester Control
Full-time	1	**105/3,5**	–	**34**	**71**		-	**Graded test - 1 s.**

Index ECM-Nf-Nsp/22-1.1/2

The Course Training Program on "Philosophical Problems of Scientific Cognition" is developed on the basis of the Educational and Professional programs, curricula and working Curriculum and Extended Curriculum of Higher Education Seekers Training for "Master" of all specialties and correspondent normative documents.

Developed by

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INTRODUCTION

Course Training Program on "Philosophical Problems of Scientific Cognition" is developed based on the "Methodical guidance for the subject course training program", approved by the order № 249/од, of 29.04.2021 and corresponding normative documents.

1. EXPLANATORY NOTES

1.1. Place, objectives, tasks of the subject

The subject of the discipline "Philosophical Problems of Scientific Cognition" is to reveal the most general relations between philosophical, socio-humanitarian and natural sciences, to act as a methodological basis for specific scientific disciplines.

Main target to study the subject is formation of students' ability to perform the theoretical analysis of scientific knowledge in the socio-cultural activities of people and the formation of practical skills in the application of scientific knowledge in various spheres of social life.

The tasks of the discipline study are:

– mastering the basic provisions of the discipline;

– acquaintance with the basic historical-scientific, historical-philosophical and modern philosophical and scientific primary sources concerning the formation of science as a productive force of society;

– development of methodological culture;

– development of skills and abilities to distinguish the subject, object, methods and techniques of scientific research;

– development of skills and abilities to apply philosophical methodology to research.

1.2. Learning outcomes the subject makes it possible to achieve:

– to find and substantiate new approaches to solving tasks and problems;

– to use the methodology and cognitive tools inherent in the chosen philosophical specialty;

– to critically comprehend, analyze and evaluate philosophical texts, apply relevant methods of their analysis and interpretation;

– to understand the connections of philosophy with other areas of scientific discourse, intellectual and humanitarian practices;

– to participate in scientific discussions on philosophy and interdisciplinary issues, discussions of philosophical issues with experts of other fields of knowledge (including aviation);

– to analyze, evaluate and forecast social, political, economic and cultural processes using professional knowledge and specialized skills to solve complex problems of science;

– to develop and implement scientific and / or applied projects in the field of philosophy of scientific knowledge and related interdisciplinary issues;

– to make effective decisions on the management of complex professional and / or educational activities in the field of philosophy of science;

– to effectively carry out analytical substantiation and information and organizational support of professional activity, the aviation industry including.

1.3. Competences the subject makes it possible to acquire:

– the ability to solve problems of research and / or innovation in the field of philosophy of science, or in the learning process, which involves research and / or innovation and is characterized by uncertainty of conditions and requirements;

– the knowledge of the subject area and understanding of professional activity;

– the ability to identify, pose and solve problems;

– the ability to conduct research at the appropriate level;

– the ability to search, handle and analyze information from various sources;

– the ability to develop and manage projects;

– the ability to be critical and self-critical, which requires knowledge of their intellectual strengths and weaknesses, the ability to use the former and minimize the impact of the latter;

– the ability to adapt and act in a new situation, which involves the ability to apply effective strategies and tools to solve cognitive problems;

– the ability to work in a team, which involves the ability to overcome communicative tensions and conflict situations, to ensure the commitment of employees, to show appropriate flexibility, to distribute efforts with / among colleagues, to work for a common result;

– the ability to use the historical and philosophical heritage of the philosophy of science in understanding and solving research problems;

– the ability to formulate and argue current ideas of the philosophy of science, to present evidence-based and substantiated research results;

– the possession of specialized knowledge within certain philosophical and scientific issues, systemic awareness of the relevant special (research) literature;

– the ability to choose and apply the most effective methodological research strategy;

– the ability to deal critically with texts, apply different methods of analysis and interpretation;

– the ability to critically evaluate the potential and boundaries of different scientific schools, which represent the main directions of development of philosophical theories of scientific communication;

– the ability to analyze, evaluate and forecast social, political, economic and cultural processes using professional knowledge.

1.4. Interdisciplinary Connections

The discipline "Philosophical Problems of Scientific Cognition" provides a scientific and philosophical level and is interconnected with the professional disciplines of undergraduate training. The knowledge and skills acquired during the study of this

discipline are used further in the study of many subsequent disciplines of professional training.

2. COURSE TRAINING PROGRAM ON THE SUBJECT

2.1. The subject content

Training material is structured according to the module principle and consists of **two educational modules:**

Module № 1 "Science as a Phenomenon of Civilization",

Module № 2 "Philosophical and Scientific Methodological Means",

that are logically complete, relatively independent, holistic parts of the subject, which mastering involves conducting a modular test and analysis of the results of its implementation..

2.2. Modular structuring and integrated requirements for each module

Module № 1 "Science as a Phenomenon of Civilization"

Integrated requirements to the module №1:

-to know the basic philosophical and methodological concepts of modern science;

-to know the specifics and basic characteristics of the philosophical foundations of science;

-to be able to conduct comprehensive research based on a systematic scientific worldview using knowledge in the field of history and philosophy of science.

Topic 1. **Information Society as the Knowledge Society**

Theories of the information society (D. Bell, E. Toffler, F. Fukuyama, M. Castells, F. Webster). Criteria for determining the Information society. Technological criterion. The role of information in the Information society. Service Industries sphere. The correspondence of services and production. Paradoxes of the Information society

Topic 2. **Theoretical Problems of Science**

Science as a system of knowledge, sphere of activity and social institution. Specifics of philosophical understanding of the phenomenon of science. The place of science in the system of culture. Definition of scientific thought by V.I.Vernadsky. Knowledge as the basis of purposeful activity. Evolution of ideas about scientific knowledge. The emergence of new knowledge as a socio-cultural and philosophical problem.

Topic 3. **Western and Native Traditions in Methodology of Science**

New European rationalism and empiricism (R. Descartes and F. Bacon). Modern Western concepts of science methodology. Philosophy of science of the analytical school. K. Popper's critical rationalism. "Historical School" in modern Western philosophy of science (A. Koire, T. Kuhn, I. Lakatos, P. Feyerabend). Domestic methodology of science (V.I. Vernadsky, B.M. Kedrov, O.I. Kedrovsky, S.B. Krymsky, V.S. Stepin, etc.).

Topic 4. **Specificity of Scientific Knowledge**

The concept of "knowledge" and "development" of the world, their relationship. The main forms of world development: spiritual-theoretical, spiritual-practical and subject-practical. Features of scientific knowledge. Subject and object of scientific knowledge. The concept of an ideal object in science. The problem of truth in philosophy and science. Truth and delusion.

Topic 5. **Unity of Empirical and Theoretical Knowledge in Scientific Cognition**

Sensual and rational in scientific cognition. The concept and essence of empirical and theoretical levels of scientific knowledge. Structure of empirical and theoretical knowledge. The specifics of empirical knowledge in modern science. Traditions and innovations in the process of empirical and theoretical research. The role of intuition and creativity in scientific knowledge.

Topic 6. **Non-Linear Mutual Influence of Philosophical and Scientific Cognition in their Historical Progress**

Modification of the concepts of philosophy and science in the process of interaction: historical and philosophical aspect. Ancient natural philosophy as a prototype of the interaction of philosophical and concrete scientific knowledge. The connection between philosophy and science in modern times (R. Descartes, Fr. Bacon, T. Hobbes, I. Newton, B. Spinoza). Classical German philosophy on the specifics of the interaction of science and philosophy (I. Kant, G. Hegel, F. Schelling). Philosophy of cosmism on the interaction of philosophical and scientific knowledge: M.O. Umov, K.E. Tsiolkovsky, O.L. Chizhevsky, V.I. Vernadsky.

Topic 7. **Interdependence of Philosophical and Scientific Knowledge in Post-modern Epoch**

Modern and Postmodern in the civilizational development of the Western world. Modernism and postmodernism in the philosophy and science of the XX century (A. Bergson, J. Habermas, G. Hacken, I. Prigogine, etc.). Postmodernist ideas in philosophy and science in the late XX and early XXI centuries (J.-F. Lyotard, P. Kozlowski, M. Foucault, etc.).

Topic 8. **Philosophical Grounds of Science.**

Ontological principles of scientific knowledge. Philosophical understanding of the object of scientific knowledge. Epistemological principles of scientific knowledge: sensory and rational, empirical and theoretical aspects of scientific research. The problem of the truth of scientific knowledge. Logical principles of scientific research. Logical procedures of substantiation and proof in science. Methodological principles of scientific knowledge. Axiological principles of scientific knowledge.

Module № 2 "Philosophical and Scientific Methodological Means"

Integrated requirements to the module №2:

Know:

-to know the logical principles of scientific knowledge and features of the language of science;

-to apply philosophical methodology as the basis of scientific knowledge;

-to use knowledge of the discipline in the process of philosophical understanding of specific communicative practices.

Topic 1. **Logical Foundations of Scientific Knowledge**

The concept of logical principles of science. Logic as the basis of rationality. Concepts and types of rationality. Scientific rationality and its historical types. Changing the type of scientific rationality in the context of the historical interaction of philosophy and science: classical, non-classical and post-classical scientific rationality.

Topic 2. **Specificity of Scientific Language**

The problem of formation of scientific concepts and terms. Everyday language as a source of formation of the language of science. The ratio of natural and artificial languages in the development of science. The phenomenon of "migration" of scientific concepts and terms in the process of functioning of science. Transformation of the language of science under the influence of the use of information and communication technologies.

Topic 3. **Philosophical Methodology as Basics of Scientific Cognition**

The concept of methodology in philosophy. Empirical and theoretical levels of organization of scientific knowledge. The structure of the empirical level of organization of scientific knowledge. The structure of the theoretical level of organization of scientific knowledge. The concept of method in philosophy. The ratio of method and methodology in the structure of philosophical knowledge. Methodological principles of scientific knowledge.

Topic 4. **Correspondence of Philosophical and Scientific Methodology**

Features of scientific methodology. Levels of methodology: philosophical, general scientific and specific scientific. The concept of the method of cognition in science. Criteria for classification of scientific methods. Empirical and theoretical methods of scientific knowledge. General scientific and specific scientific methods of cognition. Quantitative and qualitative methods of scientific research. Fundamental and applied methods of scientific knowledge. The concept of methodological approach, methodological principle and methodological tool in science.

Topic 5. **Peculiarities of Methodology of Natural, Social, Humanities, and Technical Sciences**

Explanation and understanding in the process of scientific research. Correlation of explanation and understanding as interpretive and hermeneutic procedures in natural and social sciences. The specifics of the relationship between the historical and the

logical in the natural and social sciences. The role of the human-machine system in the natural, social humanities and technical sciences.

Topic 6. **Information-Communicative Technologies in the Structure of Contemporary Scientific Knowledge**

Model and modeling in modern science. Model as a basis of modeling method in cognitive activity. Features of formation of information models as bases of modern scientific research. The essence of information modeling in modern science. Modeling of complex nonlinear processes in scientific research. Mathematical experiment as a means of integrating scientific methods. Digital transformation of science.

Topic 7. **Classification of Scientific Knowledge**

The concept and essence of classification in science. Basic principles of classification of sciences. Natural, social-humanitarian and technical sciences. Criteria for classifying sciences into empirical and theoretical. Basic and applied sciences. Historical periodization of science: classics - non-classics - post-classics. Interdisciplinary sciences.

Topic 8. **Scientific Community. Ethics of Scientist.**

Problems of forming a scientific community. Ethos of science. Problems of public recognition of scientific activity of scientists. Value aspects of scientific activity of scientists. The concept and essence of the moral responsibility of the scientist. The role of modern science in solving global problems of today. Club of Rome and the problems of modern global modeling. Features of scientific communication through social networks and digital platforms.

2.3. Training schedule of the subject

№	Theme (thematic section)	Total, hour			
		Total	Lectures	Practical classes	Self-study
1	2	3	4	5	6
Module №1 "Science as a Phenomenon of Civilization"					
1 semester					
1.1	Information Society as the Knowledge Society	6	-	2	4
1.2	Theoretical Problems of Science	6	-	2	4
1.3	Western and Native Traditions in Methodology of Science	6	-	2	4
1.4	Specificity of Scientific Knowledge	6	-	2	4
1.5	Unity of Empirical and Theoretical in Scientific Cognition	6	-	2	4
1.6	Non-Linear Mutual Influence of Philosophical and Scientific Cognition in their Historical Progress	6	-	2	4
1.7	Interdependence of Philosophical and Scientific Knowledge in Post-modern Epoch	6	-	2	4
1.8	Philosophical Grounds of Science.	6	-	2	4
1.9	Module Test №1	6	-	2	4
	Total by the module №1	**54**		**18**	**36**
Module №2 "Philosophical and Scientific Methodological Means"					
2.1	Logical Foundations of Scientific Knowledge	6	-	2	4
2.2	Specificity of Scientific Language	6	-	2	4
2.3	Philosophical Methodology as Basics of Scientific Cognition	3	-	2	3
2.4	Correspondence of Philosophical and Scientific Methodology	6			4
2.5	Peculiarities of Methodology of Natural, Social, Humanities, and Technical Sciences	6	-	2	4
2.6	Information-Communicative Technologies in the Structure of Contemporary Scientific Knowledge	6	-	2	4
2.7	Classification of Scientific Knowledge	6	-	2	4
2.8	Scientific Community. Ethics of Scientist.	6	-	2	4
2.9	Module Test №2	6	-	2	4
Total by the module №2		**51**		**16**	**35**
Total by the subject		**105**	**-**	**34**	**71**

3. BASIC CONCEPTS OF GUIDANCE ON THE SUBJECT

3.1. Teaching methods

It is recommended to use the following teaching methods during mastering the subject: - explanatory and illustrative method; - method of problem presentation; - reproductive method; - research method. The implementation of these methods are carried out during lectures, practical classes, self-study, analysis and solution of problems.

3.2. List of references

Basic literature

3.2.1. Introduction to History and Philosophy of Science / Hakob Barseghyan, Nicholas Overgaard, and Gregory Rupik. Pressbooks. 2018. – 190 p. / http://surl.li/bldnr

3.2.2. Losee John. A Historical Introduction to the Philosophy of Science. Published in the United Statesby Oxford University Press Inc., NY. 4th ed. 2010. – 328 p. / http://surl.li/bldtr

3.2.3. Philosophy (Philosophy. Logic. Religion Studies. Ethics. Aesthetics): Textbook / Edited by L.V. Kadnikova – K.: NAU, 2012. – 596 p.

3.2.4. The philosophy of science: a contemporary introduction / [Alex Rosenberg, Lee McIntyre]. – 4th ed., 2019. Routledge. – 308 p. / http://surl.li/bldnw

3.2.5. The Philosophy of Science: A Companion [Anouk Barberousse, Denis Bonnay, Mikael Cozic]. Oxford University Press, 2018. – 688 p. / http://surl.li/bldqs

3.2.6. The Routledge Companion to Philosophy of Science / Ed. by Stathis Psillos and Martin Curd. -- Published July 17, 2013 by Routledge. – 736 p./ http://surl.li/bldqv

3.2.7. U. Egbai, E.-S. Essien. History & Philosophy of Science. Publisher: Akwa Ibom State University Press, Nigeria, January 2016. – 335 p. / http://surl.li/bldqt

Additional Literature

3.2.8. Learn about specialized topics in the philosophy of science with the Stanford Encyclopedia of Philosophy / https://plato.stanford.edu/

3.2.9. Okasha S. Philosophy of Science: A very short introduction. – Oxford: Oxford University Press, 2016. – 160 p.

3.2.10. Sebastian De Haro. Science and Philosophy: A Love–Hate Relationship // Foundations of Science volume 25, pp. 297–314 (2020) / http://surl.li/bldyq

3.2.11. Understanding Science: How Science really works / http://surl.li/bldyo

3.2.12. Why science needs philosophy / By Lucie Laplanea, Paolo Mantovanic and others. PNAS. March 5, 2019. vol. 116, no. 10. - p. 3948–3952. / http://surl.li/bldys

3.3. Internet Information resource

3.3.2. Repository of NAU: http://er.nau.edu.ua:8080/submit

3.3.2. STLibrary of NAU: http://www.lib.nau.edu.ua/mai

4. RATING SYSTEM OF KNOWLEDGE AND SKILLS ASSESSMENT

4.1. Assessment of certain kinds of student academic work is carried out in accordance with table 4.1.

Table 4.1

Kind of Academic Work	Maximum Grade Values	Kind of Academic Work	Maximum Grade Values
1 semester			
Module № 1 «Philosophical Propaedeutics»		**Module № 2 «Philosophical Foundations of Modern Society Study»**	
Kind of academic work	Grade values	Kind of academic work	Grade values
The answer for practical classes (8 points x 2)	16	The answer for practical classes (8 points x 2)	16
Carrying out practical classes	20 (total)	Carrying out for practical classes	20 (total)
For admission to complete module test №1, a student must receive not less than	*22 points*	*For admission to complete module test №2, a student must receive not less than*	*22 points*
Carrying out Module Test №1	14	Carrying out Module Test №2	14
Total by the Module №1	**50**	**Total by the Module №2**	**50**
Total by the Modules №1, №2			**100**
Total by the subject			**100**

4.2. Completed types of educational work are credited to the student, if he received a positive rating for them.

4.3. The sum of rating assessments received by the student for certain types of completed academic work is the current modular rating assessment, which is recorded in the module control.

4.4. The final modular rating obtained by the student based on the results of the course defense and defense in points, on the national scale and ECTS scale is entered in the module control, as well as in the study card, individual student curriculum and Diploma Supplement, for example, as follows: ***92 / Excellent / A, 87 / Good / B, 79 / Good / C, 68 / Sat./D, 65 / Sat./E, etc.***

4.5. The final semester rating is converted into a grade on the national scale and the ECTS scale.

4.6. The Total Grade for the subject is equal to the average grade from Total Semester Grades with its further transformation into national scale and ECTS system.

The Total Grade is recorded to the Diploma Appendix

(Ф 03.02 – 01)

АРКУШ ПОШИРЕННЯ ДОКУМЕНТА

№ прим.	Куди передано (підрозділ)	Дата видачі	П.І.Б. отримувача	Підпис отримувача	Примітки
	ЦМСАО	13.09.22	[illegible]	[signature]	

(Ф 03.02 – 02)

АРКУШ ОЗНАЙОМЛЕННЯ З ДОКУМЕНТОМ

№ пор.	Прізвище ім'я по-батькові	Підпис ознайомленої особи	Дата ознайом-лення	Примітки

(Ф 03.02 – 04)

АРКУШ РЕЄСТРАЦІЇ РЕВІЗІЇ

№ пор.	Прізвище ім'я по-батькові	Дата ревізії	Підпис	Висновок щодо адекватності

(Ф 03.02 – 03)

АРКУШ ОБЛІКУ ЗМІН

№ зміни	№ листа (сторінки)				Підпис особи. яка внесла зміну	Дата внесення зміни	Дата введення зміни
	Зміненого	Заміненого	Нового	Анульо-ваного			

(Ф 03.02 – 32)

УЗГОДЖЕННЯ ЗМІН

	Підпис	Ініціали, прізвище	Посада	Дата
Розробник				
Узгоджено				
Узгоджено				
Узгоджено				
Узгоджено				