Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA
RUDN University

Faculty of Humanities and Social Sciences
(educational division (faculty/institute/academy) as program developer)

COURSE SYLLABUS

History and Philosophy of Science
(course title)

Scientific specialty:

For all postgraduate programs
(scientific specialty code and title)

The course instruction is implemented within the PhD program:

For all postgraduate programs
(PhD program title)

2025 г.

1. DISCIPLINE (MODULE) GOAL

The purpose of mastering the discipline «History and Philosophy of Science» is to prepare graduate students and applicants for the candidate's exam in the history and philosophy of science. This preparation consists of two stages. The first stage is the study of the history of the branch of knowledge in which the graduate student (applicant) carries out dissertation research. The second stage is the study of the philosophy of science, which includes two levels – the development of general problems of the philosophy of science and the study of philosophical problems of that particular branch of scientific knowledge on which the dissertation research is conducted.

2. REQUIREMENTS TO PHD-STUDENTS ON FINISHING THE COURSE

As a result of studying the discipline, the graduate student must:

Know: the basic concepts of the philosophy of science, the history of the development of scientific knowledge, the history of the formation and development of the scientific picture of the world; the main problems of demarcation of science, ontological, epistemological, social and axiological aspects of the philosophy of science, various methods of scientific knowledge of the world.

Be able to: use the knowledge of the philosophy of science to evaluate and analyze various methodological, interdisciplinary, ethical, social, cultural trends, facts and phenomena. Analyze philosophical and scientific texts and identify semantic constructions contained in them, correctly and convincingly formalize the results of mental activity, work with scientific texts and semantic constructions contained in them. Formalize text material, analyze results and theoretical conclusions into a scientific article.

Master: culture of thinking, methods and techniques of logical analysis, oral and written presentation of basic philosophical and scientific knowledge, skills of analysis of philosophical and scientific texts, methods of discussion and polemics, skills of public speech and written presentation of one's own point of view.

3. WORKLOAD OF THE DISCIPLINE AND TYPES OF ACTIVITIES

The overall workload of the discipline «History and Philosophy of Science» is 3 credit units (108 academic hours).

Types of activities		**Total ac. hrs.**	**2-nd Semesters**
Classroom activities (total), including:		72	72
в том числе:			
Lectures (LC)		40	40
Laboratory activities (LA)		–	–
Practical lessons/Seminars (PC)		32	32
Independent work			
Intermediate certification (test with assessment/exam)		36	36
Overall workload	ac. hrs.	108	108
	credits	3	3

4. CONTENT OF THE DISCIPLINE

Name of the discipline section	**Contents of the section (topic)**	**Type of study work**
Section 1. The subject of study and the main approaches of the modern philosophy of science	Topic 1.1. Three aspects of the existence of science: science as a cognitive activity, as a social institution, as a special sphere of culture. Modern philosophy of science as the study of the general laws of scientific knowledge in its historical development and changing socio-cultural context.	LC, S

	Topic 1.2. A logical-epistemological approach to the study of science. The Positivist tradition in the philosophy of science. Expansion of the field of philosophical problematics in the postpositivist philosophy of science. The concepts of K. Popper, I. Lakatos, T. Kuhn, P. Feyerabend, M. Polani.	
	Topic 1.3. Sociological and cultural approaches to the study of the development of science. The problem of internalism and externalism in understanding the mechanisms of scientific activity.	
Section 2. Science in Modern Culture	Topic 2.1. Traditionalist and technogenic types of civilizational development and their basic values. The value of scientific rationality.	LC, S
	Topic 2.2. Features of scientific cognition. Science and philosophy. Science and art. Science and common knowledge. The role of science in modern education and personality formation. The functions of science in the life of society (science as a worldview, as a productive and social force).	
Section 3. The emergence of science and the main stages of its evolution	Topic 3.1. Pre-science and science. Two strategies for generating knowledge: generalization of practical experience and the construction of theoretical models that provide a way beyond the existing historically established forms of production and common experience.	LC, S
	Topic 3.2. The culture of the ancient polis and the formation of the first forms of theoretical science. Ancient logic and mathematics. Development of logical norms of scientific thinking and organizations of science in medieval universities. The role of Christian theology in changing the contemplative position of a scientist: man is a creator with a small letter; manipulation of natural objects — alchemy, astrology, magic. Western and Eastern medieval science.	LC, S
	Topic 3.3. The formation of experimental science in the European culture of Modern Time. Formation of ideals of mathematized and experienced knowledge: Oxford School, R. Bacon, W. Occam. Prerequisites for the emergence of the experimental method and its connection with the mathematical description of nature: G. Galileo, F. Bacon, R. Descartes. The worldview role of science in the European culture of Modern Time. Socio-cultural prerequisites for the emergence of the experimental method and its connection with the mathematical description of nature.	LC, S

Section 4. Structure of scientific knowledge	Topic 4.1. Scientific knowledge as a complex developing system. The variety of types of scientific knowledge. Empirical and theoretical levels, criteria for its distinction. Features of the empirical and theoretical language of science. The structure of empirical knowledge. Experiment and observation. Random and systematic observations. The use of natural objects in the function of instruments in systematic observation. Observation data as a type of empirical knowledge. Empirical dependencies and empirical facts. Fact formation procedures. The problem of theoretical conditionality of scientific fact.	LC, S
	Topic 4.2. The structure of theoretical knowledge. Primary theoretical models and laws. Developed theory. Theoretical models as an element of the internal organization of the theory. The limitations of the hypothetical-deductive approach of theoretical knowledge. The role of constructive methods in the deductive unfolding of theory. Theory deployment as a problem solving process. Paradigmatic patterns of problem solving as part of the theory. Problems of the genesis of samples. Mathematization of theoretical knowledge. Types of interpretation of the mathematical apparatus of the theory.	LC, S
	Topic 4.3. The bases of science. The structure of the bases. The ideals and norms of research, and its socio-cultural dimension. The system of ideals and norms as a scheme of the method of activity. The scientific picture of the world. Historical forms of the scientific picture of the world. Functions of the scientific picture of the world (the picture of the world as an ontology, as a form of systematization of knowledge, as a research program). Operational foundations of the scientific picture of the world. The relation of the ontological postulates of science to the ideological dominants of culture. Philosophical foundations of science. The role of philosophical ideas and principles in the substantiation of scientific knowledge. Philosophical ideas as a heuristic of scientific search. Philosophical justification as a condition for the inclusion of scientific knowledge in culture. Logic and methodology of science. Methods of scientific cognition and its classification.	LC, S

Section 5 Mechanisms of generation of new knowledge in science.	Topic 5.1. Historical variability of the mechanisms of scientific knowledge generation. The interaction of the foundations of science and experience as the initial stage of the formation of a new discipline. The problem of classification. The reverse effect of empirical facts on the foundations of science. Formation of primary theoretical models and laws. The role of analogies in theoretical search. Procedures for substantiating theoretical knowledge. The relationship between the logic of discovery and the logic of justification. Mechanisms of development of scientific concepts.	LC, S
	Topic 5.2. The formation of a developed scientific theory. Classical and non-classical variants of theory formation. Genesis of problem solving samples. Problematic situations in science. The development of private tasks into problems. The development of the foundations of science under the influence of new theories. The problem of including new theoretical concepts in culture.	
Section 6. Scientific paradigms and scientific revolutions. Types of scientific rationality	Topic 6.1. Interaction of traditions and the emergence of new knowledge. Scientific paradigms. Scientific revolutions as a restructuring of the foundations of science. Typology of scientific revolutions. Interdisciplinary mechanisms of scientific revolutions. Interdisciplinary interactions and "paradigm vaccinations" as a factor of revolutionary transformations in science. Sociocultural prerequisites of global scientific revolutions. Restructuring of the foundations of science and changing the meanings of ideological universals of culture. The predictive role of philosophical knowledge. Philosophy as the generation of categorical structures necessary for the development of new types of system objects.	LC, S
	Topic 6.2. Scientific revolutions as bifurcation points in the development of knowledge. The nonlinearity of knowledge growth. The selective role of cultural traditions in the choice of scientific development strategies. The problem of potentially possible histories of science. Global revolutions and types of scientific rationality. Historical change of types of scientific rationality: classical, non-classical, post-non-classical science.	

Section 7. Features of the modern stage of science development. Prospects of scientific and technological progress	Topic 7.1. The main characteristics of modern, post-non-classical science. Modern processes of differentiation and integration of sciences. The relationship between disciplinary and problem-oriented research. Mastering self-developing "synergetic" systems and new strategies of scientific research. The role of nonlinear dynamics and synergetics in the development of modern ideas about historically developing systems. Global evolutionism as a synthesis of evolutionary and systemic approaches. Global evolutionism and the modern scientific picture of the world. Convergence of the ideals of natural science and socio-humanitarian cognition.	LC, S
	Topic 7.2. Understanding the connections of social and intra-scientific values as a condition for the modern development of science. Inclusion of social values in the process of choosing research strategies. Expanding the ethos of science. New ethical problems of science at the end of the XX century. The problem of humanitarian control in science and high technologies. Environmental and socio-humanitarian expertise of scientific and technical projects. The crisis of the ideal of value-neutral research and the problem of ideologized science. Environmental ethics and its philosophical foundations. Philosophy of Russian Cosmism and V.I. Vernadsky's teaching about the biosphere, technosphere and noosphere. Problems of environmental ethics in modern Western philosophy.	
	Topic 7.3. Post-non-classical science and the change of ideological attitudes of technogenic civilization. Scientism and anti-scientism. Science and parascience. The search for a new type of civilizational development and new functions of science in culture. Scientific rationality and the problem of the dialogue of cultures. The role of science in overcoming modern global crises.	
Section 8. Science as a social institution	Topic 8.1. Various approaches to the definition of a social institution of science. Historical development of institutional forms of scientific activity. Scientific communities and their historical types (republic of scientists of the XVII century; scientific communities of the era of disciplinarily organized science; formation of interdisciplinary communities of science of the XX century). Scientific schools. Training of scientific personnel.	LC, S

	Topic 8.2. The historical development of ways of translating scientific knowledge (from handwritten publications to a modern computer). Computerization of science and its social consequences. Science and economics. Science and power. The problem of secrecy and closeness of scientific research. The problem of state regulation of science.	
Section 9. Philosophical problems of technique	Topic 9.1. Philosophical problems of technique. Philosophy of technology and methodology of technical sciences. The problem of the meaning and essence of technique: "technical" and "non-technical". Interaction of science and technique: basic models. The problem of the negative impact of technology on the surrounding world, society and the essence of man.	LC, S

5. EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Room Type	**Room Equipment**	**Specialized educational / laboratory equipment, software and materials for mastering the discipline**
Lecture	Classroom for lectures, equipped with a set of specialized furniture; a set of devices including portable multimedia projector, laptop, projection screen, stable wireless Internet connection.	Multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Office 365 (MS Office, MS Teams), Chrome
Lab	Classroom for lab work, group and individual consultations, evaluation and assessment, equipped with a set of specialized furniture; a set of devices including portable multimedia projector, laptop, projection screen, stable wireless Internet connection.	Multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Office 365 (MS Office, MS Teams), Chrome
Seminars	Classroom for seminars, group and individual consultations, evaluation and assessment, equipped with a set of specialized furniture; a set of devices including portable multimedia projector, laptop, projection screen, stable wireless Internet connection.	Multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Office 365 (MS Office, MS Teams), Chrome
Computer classroom	Computer classroom for academic activity, group and individual consultations, evaluation and assessment, equipped with a set of specialized furniture; a set of devices including portable multimedia projector, 30 personal	Multimedia projector, laptop, projection screen, stable wireless Internet connection.

	computers, projection screen, stable wireless Internet connection.	Software: Office 365 (MS Office, MS Teams), Chrome
Self-studies Classroom	Classroom for Self-studies, equipped with a set of specialized furniture; a set of devices including portable multimedia projector, laptop, projection screen, stable wireless Internet connection.	Multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Office 365 (MS Office, MS Teams), Chrome
Courtroom	Classroom for court hearing simulation equipped with a set of specialized furniture; a set of devices including portable multimedia projector, laptop, projection screen, stable wireless Internet connection.	Multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Office 365 (MS Office, MS Teams), Chrome

6. METHODOLOGICAL SUPPORT AND LEARNING MATERIALS

Main readings:

1. Lars-Göran Johansson. Philosophy of Science for Scientists. Springer Cham, 2016. – 257 p.

2. Alex Rosenberg. Philosophy of Science. A contemporary introduction. Taylor & Francis e-Library, 2005. – 224 p.

3. E. Nikolaeva, N. Khazieva. History and philosophy of science: common problems. Textbook for masters, graduate students and applicants. Kazan, 2017. – 224 p.

4. Stepin Vyacheslav Semenovich. Philosophy and methodology of science. Favourites [Text/electronic resource] / V.S. Stepin. - Electronic text data. - M.: Academic project: Alma Mater, 2015. - 716 p. - (Philosophical technologies: Selected philosophical works). http://lib.rudn.ru/ProtectedView/Book/ViewBook/6753

5. Markhinin Vasily Vasilyevich. Lectures on the philosophy of science [Electronic resource]: Textbook / V.V. Markhinin. - M. : University Book, 2016. - 428 p. http://lib.rudn.ru/ProtectedView/Book/ViewBook/6068

Additional readings:

1. Gnatik E.N. Philosophical problems of astronomy and cosmology [Electronic resource]: Educational and methodological manual on the discipline "Philosophical problems of natural sciences, technical and humanities" / E.N. Gnatik. - Electronic text data. - Moscow: RUDN Publishing House, 2018. – 56 p/ http://lib.rudn.ru/ProtectedView/Book/ViewBook/6492

2. Gnatik E.N. Philosophical problems of geology [Electronic resource]: Educational and methodological manual on the discipline "Philosophical problems of natural sciences, technical and humanities" / E.N. Gnatik. - Electronic text data. - M.: RUDN Publishing House, 2018. - 32 p. http://lib.rudn.ru/ProtectedView/Book/ViewBook/6493

3. History and Philosophy of science (Philosophical Sciences) [Text/electronic resource]: Educational and methodical manual for preparation for the candidate's exam / Comp. S.A. Lokhov; Edited by V.M. Naidysh. - Electronic text data. - M.: RUDN Publishing House, 2013. - 95 p. http://lib.rudn.ru/ProtectedView/Book/ViewBook/3932

4. Mamchenkov Dmitry Valeryevich. Philosophy of Technology [Text/electronic resource]: Educational and methodical manual / D.V. Mamchenkov. - Electronic text data. - Moscow: RUDN Publishing House, 2013. - 47 p. http://lib.rudn.ru/ProtectedView/Book/ViewBook/3130

5. Orest Vladimirovich Martyshin. Philosophy of law: Textbook for masters / O.V. Martyshin. - M.: Prospect, 2017. - 352 p.

6. Andrey Mikhailovich Orekhov. Philosophy of sociology: a view from the side of social philosophy // Vestnik Peoples' Friendship University of Russia: Philosophy. - 2017. - No. T. 21 (4). - S.565 - 571. http://journals.rudn.ru/philosophy/article/view/17667/15373

Internet sourses:

ELS RUDN University and third party EBS, to which university students have accessbased signed contracts:

−RUDN Electronic Library System, http://lib.rudn.ru/MegaPro/Web;

−ELS University Library Online, http://www.biblioclub.ru;

−EBS Urayt, http://www.biblio-online.ru;

−ELS Student Consultant, http://www.studentlibrary.ru;

−EBS Lan, http://e.lanbook.com ;

−EBS Trinity Bridge http://www.trmost.ru

Databases and search engines:

−Electronic fund of legal and normative-technical documentation, http://docs.cntd.ru ;

−Yandex search system https://www.yandex.ru;

−Google search system https://www.google.com;

−Reference database Scopus, http://www.elsevierscience.ru/products/scopus

Educational and methodological materials for students' self-work studying the discipline / module:

A course of lectures on the discipline «History and Philosophy of Science».

7. ASSESSMENT TOOLKIT AND GRADING SYSTEM FOR MIDTERM ATTESTATION OF STUDENTS IN THE DISCIPLINE (MODULE)

Assessment toolkit and a grading system to evaluate the level of competences (competences in part) formation as the course results are specified on the TUIS platform.

DEVELOPERS:

Associate Professor of the Department of Ontology and Theory of Knowledge		Dmitry V. Mamchenkov
Position, Name of the Department	Signature	Full name

HEAD OF THE DEPARTMENT

Head of the Department of Ontology and Theory of Knowledge, Full Professor		Vladimir N. Belov
Position, Name of the Department	Signature	Full name