

Документ подписан простой электронной подписью
Информация о владельце:
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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
RUDN University**

FACULTY OF HUMANITIES AND SOCIAL SCIENCES
educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

HISTORY AND PHILOSOPHY OF SCIENCE
course title

Recommended by the Didactic Council for the Education Field of:

For all postgraduate programs implemented at RUDN University
field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:

Theoretical mechanics, machine dynamics

higher education programme profile/specialisation title

1. GOAL OF MASTERING THE DISCIPLINE

The purpose of mastering the discipline "History and Philosophy of Science" is to prepare graduate students and applicants for the PhD 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 the philosophical problems of that particular branch of scientific knowledge, on which the dissertation research is being conducted.

2. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE

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

Know: the basic concepts and 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 associated with the 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 highlight the semantic structures contained in them, correctly and convincingly draw up the results of mental activity, work with scientific texts and the semantic structures contained in them. To arrange text material, analysis results and theoretical conclusions in a scientific article.

Possess: a culture of thinking, methods and techniques of logical analysis, oral and written presentation of basic philosophical and scientific knowledge, skills in the 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. COURSE WORKLOAD AND ACADEMIC/TRAINING/LEARNING ACTIVITIES

The total labor intensity of the discipline "Mathematical and software support for computer systems, complexes and computer networks" is 3 credits.

Table 3.1. Types of educational work by periods of mastering the postgraduate program
Table 3.1. Types of educational work for full-time education

Type of educational activity	Total number of hours	Semester(s)			
		1	2	3	4
<i>Contact academic hours</i>	68	68			
<i>Lectures (L)</i>	40	40			
<i>Lab work (LW)</i>					
<i>Seminars (workshops/tutorials) (S)</i>	28	28			
<i>Self-study(ies)</i>	40	40			
<i>Evaluation and assessment (exam/pass/fail grading)</i>					
Total labor intensity	108	108	108		
	3	3	3		

4. COURSE MODULES AND CONTENTS

Table 5.1. Content of the discipline (module) by types of educational work

Name of discipline section	Content of the section (topics)	Types of educational work *
Section 1. Subject and main concepts of modern philosophy of science	<p>Topic 1.1. Three aspects of the existence of science: science as a cognitive activity, as 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.</p> <p>Topic 1.2. Evolution of approaches to the analysis of science. Logico-epistemological approach to the study of science. positivist tradition in the philosophy of science. Expanding the field of philosophical problems in the post-positivist philosophy of science. Concepts of K. Popper, I. Lakatos, T. Kuhn, P. Feyerabend, M. Polanyi.</p> <p>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.</p>	L, S
Section 2. Science in the culture of modern civilization	<p>Topic 2.1. Traditionalist and technogenic types of civilizational development and their basic values. Value scientific rationality.</p> <p>Topic 2.2. Features of scientific knowledge. Science and philosophy. Science and art. Science and ordinary 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 productive and social force).</p>	L
Section 3. The emergence of science and the main stages of its historical evolution	<p>Topic 3.1. Pre-science and science in the proper sense of the word. Two strategies for generating knowledge: generalization of practical experience and construction of theoretical models that provide a way out of the existing historically established forms production and everyday experience.</p> <p>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 Change the contemplative position of the scientist: man is a creator with a small letter; manipulation of natural objects - alchemy, astrology, magic. Western and Eastern medieval science.</p> <p>Topic 3.3. The formation of experimental science in the new European culture. Formation of the ideals of mathematized and experimental knowledge: the Oxford</p>	L, S

	<p>school, R. Bacon, W. Ockham. Prerequisites for the emergence of the experimental method and its connection with the mathematical description of nature: G. Galileo, F. Bacon, R. Descartes.</p> <p>The ideological role of science in the new European culture. Sociocultural prerequisites for the emergence of the experimental method and its combination with a mathematical description of nature.</p> <p>Topic 3.4. Formation of science as a professional activity. The emergence of disciplinary organized science. Technological applications of science. Formation of technical sciences. Formation of social and human sciences. Worldview foundations of socio-historical research.</p>	
<p>Section 4. Structure of scientific knowledge</p>	<p>Topic 4.1. Scientific knowledge as a complex developing system. Variety of types of scientific knowledge. Empirical and theoretical levels, criteria for their distinction. Features of the empirical and theoretical language of science.</p> <p>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.</p> <p>The problem of the theoretical loading of the fact.</p> <p>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.</p> <p>The limitations of the hypothetical-deductive concept of theoretical knowledge. The role of constructive methods in the deductive development of the theory. Deployment of theory as a process of problem solving. Paradigmatic patterns of problem solving as part of the theory. Problems of sample genesis. Mathematization theoretical knowledge. Types of interpretation of the mathematical apparatus of the theory.</p> <p>Topic 4.3. Foundations of science. Foundation structure. Ideals and norms of research, and their sociocultural dimensions. The system of ideals and norms as a scheme of method activities. Scientific picture of the world. Historical forms of the scientific picture of the world. Functions of the scientific picture of the world (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.</p> <p>Philosophical foundations of science. The role of philosophical ideas and principles in</p>	<p>L</p>

	<p>substantiation of scientific knowledge. Philosophical ideas as heuristics of scientific research.</p> <p>Philosophical justification as a condition for the inclusion of scientific knowledge in culture. Logic and methodology of science. Methods of scientific knowledge and their classification.</p>	
<p>Section 5. The dynamics of science as a process of generation of new knowledge</p>	<p>Topic 5.1. Historical variability of the mechanisms of generation of scientific knowledge. The interaction of the foundations of science and experience as the initial stage in the formation of a new disciplines. The problem of classification. The reciprocal effect of empirical facts on the foundations of science. Formation of primary theoretical models and laws. The role of analogies in theoretical research. Procedures for substantiating theoretical knowledge. The relationship between the logic of discovery and the logic of justification. Mechanisms for the development of scientific concepts.</p> <p>Topic 5.2. Formation of a developed scientific theory. Classical and non-classical variants of theory formation. Genesis of problem solving patterns. Problem situations in science. The development of private tasks into problems. The development of the foundations of science under the influence of new theories. Turn on problem new theoretical ideas in culture.</p>	L, S
<p>Section 6. Scientific traditions and scientific revolutions. Types of scientific rationality</p>	<p>Topic 6.1. The interaction of traditions and the emergence of new knowledge. Scientific revolutions as a restructuring of the foundations of science. Problems of the typology of scientific revolutions. Intradisciplinary mechanisms of scientific revolutions. Interdisciplinary interactions and "paradigm inoculations" as a factor of revolutionary changes in science. Sociocultural background of global scientific revolutions. Restructuring the foundations of science and changing the meanings of worldview universals of culture. The predictive role of philosophical knowledge. Philosophy as a generation of categorical structures, necessary for the development of new types of system objects.</p> <p>Topic 6.2. Scientific revolutions as dots bifurcations in the development of knowledge. Nonlinear growth of knowledge. Selective role of cultural traditions in the choice of scientific development strategies. The problem of potential histories of science. Global revolutions and types of scientific rationality. Historical change of types of scientific rationality: classical, non-classical, post-non-classical science.</p>	L, S
<p>Section 7. Features of the modern stage of development</p>	<p>Topic 7.1. The main characteristics of modern, post-non-classical science. Modern processes of differentiation and integration of sciences. Relationship between disciplinary and problem-oriented research. Mastering self-developing</p>	L, S

<p>f science. Prospects or scientific and technological progress</p>	<p>"synergistic" systems and new strategies for 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. Rapprochement of the ideals of natural-scientific and social-humanitarian knowledge.</p> <p>Topic 7.2. Understanding the links between social and intrascientific 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 20th century.</p> <p>The problem of humanitarian control in science and high technologies. Ecological and social-humanitarian expertise of scientific and technical projects. Crisis of the ideal value-neutral research and the problem of ideologized science.</p> <p>Ecological ethics and its philosophical foundations. The philosophy of Russian cosmism and the teachings of V.I. Vernadsky about the biosphere, technosphere and noosphere. Problems of Ecological Ethics in Modern Western Philosophy (B. Kallikot, O. Leopold, R. Attfield).</p> <p>Topic 7.3. Post-non-classical science and changing the worldview of technogenic civilization. Scientism and anti-scientism. Science and parascience. 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.</p> <p>The role of science in overcoming modern global crises.</p>	
<p>Section 8. Science as a social institution</p>	<p>Topic 8.1. Different approaches to the definition of the social institution of science. Historical development of institutional forms of scientific activity. Scientific Communities and Their Historical Types (Republic of Scientists XVII in.; scientific communities of the era of disciplinary organized science; formation interdisciplinary communities of science of the XX century). Scientific schools. Training of scientific personnel.</p> <p>Topic 8.2. Historical development of methods of translation of scientific knowledge (from handwritten editions to the modern computer).</p> <p>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.</p>	<p>L, S</p>

<p>Section 9.1. Philosophical problems of mathematics</p>	<p>Topic 9.1.2. Philosophical problems of the emergence and historical evolution of mathematics in a cultural context. Causes and origins of mathematical knowledge. Practical, religious foundations of the original mathematical representations. Mathematics in pre-Greek civilizations. Dogmatic (recipe) presentation of the results in the mathematical texts of the Ancient East. The problem of the influence of Egyptian and Babylonian mathematics on the mathematics of Ancient Greece. The birth of mathematics as a theoretical science in Ancient Greece. Pythagoreans. The discovery of incommensurability. Geometric algebra and its justification. Aporia of Zeno. Atomism of Democritus and infinitesimal procedures in Antiquity. The place of mathematics in philosophy of Plato. Mathematics of the Hellenistic Age. Synthesis of Greek and ancient Eastern socio-cultural and scientific traditions. Axiomatic construction of mathematics in Euclid's "Elements" and its philosophical premises. The problem of actual infinity in ancient mathematics. The place of mathematics in philosophical concept of Aristotle. Value hierarchies of objects, means of solving problems and classification of curves in ancient geometry. "Arithmetic" of Diophantus and elements of a return to the Babylonian tradition. Mathematics in ancient and medieval India. Negative and irrational numbers. The ritual geometry of the treatise "Shulva Sutra". Illumination as a way to substantiate mathematical results. Mathematics and astronomy. Mathematics in Ancient and Medieval China. Medieval mathematics of the Arab East. "Arabic" numerals as a source of new mathematical knowledge. Separation of algebra into an independent science. Philosophy of geometry in connection with attempts to prove the fifth postulate of Euclid. Mathematics and astronomy. Mathematics in Medieval Europe. Practically oriented geometric and trigonometric information from L. Pisa (Fibonacci). The development of ancient natural-philosophical ideas and mathematics. Scholastic theories of magnitude change as an anticipation of the infinitesimal methods of modern times. Discussions on the problems of the infinite and the continuous in mathematics. Mathematics in the Renaissance. Decision problem algebraic 3rd and 4th degrees as the basis for the emergence of new ideas about mathematical quantities. Algebra F. Vieta. The problem of perspective in painting and mathematics. "Philosophical theory" of imaginary and complex numbers in</p>	<p>L, S</p>
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"Algebre" R. Bombelli. Mathematics and the scientific and technological revolution of the beginning of the New Age. The problem of infinity.

Philosophical context of analytic geometry.

Achievements in the field of algebra and their natural scientific significance. The first theoretical and probabilistic representations.

"Probabilistic" epistemology in the works of philosophers of modern times and the problem creation of probabilistic logic (Leibniz). Philosophical context of the discovery of differential and integral calculus by I. Newton and G. Leibniz. The problem of rationale for algorithms differential and integral calculus. Criticism of Berkeley and Newtenthwaite. Non-standard analysis by A. Robinson (1961) and a new look at the history of the emergence and initial development of infinitesimal analysis. The development of mathematical analysis in the XVIII century. The problem of the foundations of analysis. Philosophical ideas of B. Bolzano in the field of function theory. K. Weierstrass and the arithmetization of analysis.

Theory and philosophy of the real number.

The evolution of geometry in the 19th century. and its philosophical significance - the discovery hyperbolic geometry and its justification, interpretation of non-Euclidean geometry.

"Erlangen Program" by F. Klein as a new look at the structure of geometry. P.-S. Laplace, his philosophical views on the essence of probability and the formation of probability theory as an exact science. Set theory as the foundation of mathematics: G. Kantor and the creation of a "naive" theory sets. Discovery of the paradoxes of set theory and their philosophical understanding. Mathematical logic as a tool for substantiating mathematics and as the foundation of mathematics. G. Frege's views on the nature of mathematical thinking. The program of logical unification of mathematics.

"Foundations of Geometry" by D. Hilbert and the formation of geometry as a formal axiomatic discipline.

Philosophical problems of probability theory at the end of XIX

- the middle of the XX century.

Topic 9.1.3. Patterns of development of mathematics.

Internal and external factors in the development of mathematical theory. Apology

"pure" mathematics (G. Hardy). B. Hessen on the social roots of Newtonian mechanics.

National mathematical schools and peculiarities of national mathematical traditions (L. Bieberbach).

Mathematics as a set of "cultural elements" (R. Wilder).

The concept of F. Kitcher: the evolution of mathematics as a transition from the original (primitive) mathematical practice to subsequent ones. Relay races in mathematics (M. Rozov). Impact of Needs and Demands other sciences, technology on the development of mathematics.

The concept of scientific revolutions by T. Kuhn and problems of its application to the analysis of the development of mathematics. Characteristics of continuity of mathematical knowledge. D. Dauben, E. Koppelman, M. Crow, R. Wilder on the specifics of revolutions in mathematics. Mathematical paradigms and their difference from natural science paradigms. Classification of revolutions in mathematics. Falsificationism of K. Popper and the concept of scientific research programs of I. Lakatos. Possibilities of applying the concept of scientific research programs to the study of the development of mathematics. The problem of the existence of potential falsifiers in mathematics.

Topic 9.1.4. Philosophical concepts of mathematics. Pythagoreanism as the first philosophy of mathematics. Number as the cause of things, as the basis of things and as a way of understanding them. Numerical mysticism. Influence on the Pythagorean ideology of the discovery of incommensurable quantities and paradoxes Zeno. Pythagoreanism in the writings of Plato. Criticism of Pythagoreanism by Aristotle.

The empirical concept of mathematical concepts in Aristotle. The primacy of things before numbers. Explanation of the rigor of mathematical thinking. Justification of the empirical view of mathematics in Bacon and Newton. Mathematical empiricism of the 17th-19th centuries. Empiricism in philosophy of mathematics of the 19th century (J. St. Mill, G. Helmholtz, M. Pash). Modern concepts of empiricism: naturalism of N. Goodman, empiricism of I. Lakatos, naturalism of F. Kitcher.

Disadvantages of the empirical foundation of mathematics. Philosophical premises of apriorism. A priori settings.

The speculative nature of mathematical truths. Leibniz's apriorism. Justification of the analyticity of mathematics in Leibniz.

Kant's understanding of mathematics as a priori synthetic knowledge. Non-Euclidean geometries and Kant's philosophy of mathematics.

Husserl's version of apriorism. Problems of Phenomenological Foundation of Mathematics. origins

formalist understanding of mathematical existence. G. Kantor's ideas about the relationship between immanent and transient truth. Formalist understanding of existence (A. Poincaré and D. Gilbert). Modern concepts of mathematics.

Empirical philosophy of mathematics. Criticism of the Euclidean attitude and the idea of absolute substantiation of mathematics in the works of I. Lakatos. Aprioristic ideas in modern philosophy and methodology of mathematics. Program of N. Bourbaki and concept of mathematical structuralism. Mathematical Platonism. Realism as a thesis about the ontological basis of mathematics. Radical realism of K. Gödel. Realism and the problem of non-inductivist justification of set theory. Physicalism.

Sociological and sociocultural concepts of the nature of mathematics.

Topic 9.1.5. Philosophy and the problem of substantiation of mathematics. The problem of substantiating mathematical knowledge on various stages of its development. Geometric substantiation of algebra in Antiquity. The problem of substantiating mathematical analysis in the 18th century. The search for a unified foundation of mathematics within the framework of the axiomatic method. Opening paradoxes and the formation of the modern problem of substantiation of mathematics.

Logicist attitude of G. Frege. Criticism of psychologism and Kantian intuitionism in the understanding of number. Difficulties of G. Frege's concept. Representation of mathematics based on the theory of types and the logic of relations (B. Russell and A. Whitehead). The results of K. Gödel and A.

Tarsky. Methodological flaws and main achievements of the logicist analysis of mathematics. L. Brouwer's ideas on the logicistic substantiation of mathematics.

Prainuition as the initial base of mathematical thinking. The problem of existence. L. Brouwer's doctrine of construction as the only legitimate way to justify mathematical existence. Brouwer's critique of the law of the excluded middle. Insufficiency of intuitionism as a program for substantiating mathematics. Consequences of intuitionism for modern mathematics and methodology of mathematics. Hilbert scheme

absolute substantiation of mathematical theories on the basis of finite and meaningful metatheory. The concept of finitism. Going beyond finitism in set-theoretic and semantic

proofs of the consistency of arithmetic (G. Gentsen, P. Novikov, N. Nagorny). The theorems of K. Gödel and the program of D. Hilbert: modern discussions.

	<p>Topic 9.1.6. Philosophical-methodological and historical problems of science mathematization. Applied math. Logic and features of applications of mathematics. Mathematics as the language of science. Levels of knowledge mathematization: quantitative processing of experimental data, construction of mathematical models of individual phenomena and processes, creation of mathematized theories. The specificity of the application of mathematics in various fields of knowledge. New opportunities for applying mathematics offered by category theory, catastrophe theory, fractal theory, etc. The problem of finding an adequate mathematical apparatus for creating new applications. Mathematical hypothesis as a method of development of physical knowledge. Mathematical anticipation. "Incomprehensible efficiency" of mathematics in physics: the problem of rational explanation. Stages of mathematization in physics. Non-classical phase (relativity theory, quantum mechanics). The problem of uniqueness physical theory, associated with a rich choice of suitable mathematical constructions. Postclassical phase (axiomatic and constructive field theories, etc.). Prospects for mathematization of non-physical areas of natural science. Limits, difficulties and prospects for the mathematization of humanitarian knowledge. Computational, conceptual and metaphorical applications of mathematics. Limits of applicability of probabilistic-statistical methods in scientific knowledge. The "moral applications" of probability theory are illusions and reality. Math modeling: prerequisites, stages of model building, choice of adequacy criteria, problem of interpretation. Comparative analysis mathematical modeling in various fields of knowledge. Mathematical Modeling in Ecology: Historical and Methodological Analysis. Application of mathematics in the financial sector: history, results and prospects. Mathematical methods and models and their application in the decision-making process in the management of complex socio-economic systems: opportunities, prospects and limitations. Computer and mathematical modeling. Mathematical experiment.</p>	
<p>Section 9.2. Philosophical problems of physics</p>	<p>Topic 9.2.1. The place of physics in the system of sciences. Natural sciences and culture. Natural science and development of technology. Natural science and social life of society. Physics as the foundation of natural science.</p>	<p>L, S</p>

	<p>Ontological, epistemological and methodological foundations</p> <p>fundamentals of physics. Specificity of methods of physical knowledge. Relationship between the problem of the fundamental nature of physics and the opposition between reductionism and anti-reductionism. Analysis of various interpretations of reductionism.</p> <p>Physics and synthesis of natural science and humanitarian knowledge. The role of synergetics in this synthesis.</p> <p>Topic 9.2.2. Ontological problems of physics. The concept of the ontology of physical knowledge.</p> <p>Ontological status of the physical picture of the world. The evolution of the physical picture of the world and the change in the ontology of physical knowledge.</p> <p>Mechanical, electromagnetic and modern quantum-relativistic pictures of the world as stages in the development of physical knowledge. Particles and fields as fundamental abstractions of modern physical picture of the world and the problem of their ontological status. Ontological status of virtual particles. Problems of classification of fundamental particles. Types of interactions in physics and the nature of interactions.</p> <p>standard model</p> <p>fundamental particles and interactions and its conceptual difficulties. Physical vacuum and the search for a new ontology. The strategy of searching for fundamental objects and the bootstrap idea. String theory and the "theory of everything"</p> <p>(TOE) and the problems of their justification.</p> <p>Topic 9.2.3. Problems of space and time. The problem of space and time in classical mechanics. The role of the Copernican system of the world in the formation of Galilean-Newtonian ideas about space. Concept of inertial system and Galileo's principle of inertia. Galileo's principle of relativity, Galileo's transformations and the concept of covariance of the laws of mechanics. The concept of absolute space. Philosophical and religious background concept</p> <p>absolute space and the problem of its ontological status.</p> <p>Theoretical, experimental and methodological prerequisites for changing the Galilean-Newtonian ideas about space and time in connection with the transition from the mechanical to the electromagnetic picture of the world. Special and general theories</p> <p>relativity (SRT and GR) by A. Einstein as modern concepts of space and time. Substantial and relational concepts of space and time. The status of the relational concept of space and time in SRT. The concept of a single space-time continuum G. Minkowski. Relativistic effects of length contraction, time dilation and mass-velocity dependence in inertial frames of reference.</p> <p>Analysis of the role of the observer in relativistic physics.</p>	
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Theoretical, methodological and aesthetic prerequisites for the emergence of general relativity. The role of the principle of equivalence of inertial and gravitational masses in general relativity. The status of the substantial and relational concepts of space-time in general relativity. The problem of the relationship between the space-time continuum and the gravitational field. Space-time and vacuum.

The concept of the geometrization of physics at the present stage. The concept of gauge fields. Interpretation of interactions within the framework of the theory of gauge fields.

Topological properties of space-time and fundamental physical interactions.

Topic 9.2.4. The concept of determinism. The concept of determinism and its role in physical cognition.

Determinism and causality. Discussions in the philosophy of science about the nature of causal relationships.

D. Hume's criticism of the principle of causality as a generative connection. Causality and Law.

The opposition of causality and law in the works of O. Comte. Criticism of Comte's concept in the works of B. Russell, R. Carnap, K. Popper.

The idea of the existence of two levels of causality: visual and theoretical causality. Causality and expediency.

Teleology and teleonomy. Causal and functional explanation.

The contribution of Darwinism and cybernetics to demystification of the concept of purpose. The concept of purpose in synergetics. The concept of a light cone and relativistic causality. Problems

determinism in classical physics. The concept of unambiguous (hard) determinism. Statistical regularities and probability distributions in classical physics. The probabilistic nature of the patterns of the microworld. The status of probability in classical and quantum physics.

The concept of probabilistic causality. Popper's concept of predispositions and the determinism-indeterminism dilemma. Discussions on the problems of hidden parameters and the completeness of quantum mechanics. Philosophical meaning of N. Bohr's concept of complementarity and W. Heisenberg's uncertainty principle.

Changing ideas about character

physical laws in connection with the concept "Big Bang" in cosmology and

formation of synergy. Causality in open non-equilibrium dynamical systems.

Topic 9.2.5. Knowledge of complex systems and physics. System ideas in physics.

Representation of physical objects as systems. Three types of systems: simple mechanical systems; feedback systems; systems with self-development (self-organizing systems).

The contradiction between classical thermodynamics and evolutionary biology and the concept of self-organization. Thermodynamics of open non-equilibrium systems I. Prigogina. The status of the concept of time in mechanical systems and systems with self-development. The irreversibility of the laws of nature and the "arrow of time". Synergetics as one of the sources of evolutionary ideas in physics. Deterministic chaos and evolutionary problems.

Topic 9.2.6. The problem of objectivity in modern physics. Quantum mechanics and postmodern denial of truth in science. The ambiguity of the term "objectivity" of knowledge: objectivity as the "objectivity" of the description (description of reality without reference to the observer) and objectivity in the sense the adequacy of the theoretical description of reality. The difficulty of achieving the "objectivity" of the description and the feasibility of obtaining knowledge adequate to reality. Difficulties in achieving objectively true knowledge. "Underdetermination" of the theory by empirical data and non-empirical criteria for evaluating theories. "Theoretical loading" of experimental data and theoretically neutral language of observation. The role of social factors in achieving true knowledge. Critical tradition in the scientific community and the condition for achievement objectively true knowledge (K. Popper).

Topic 9.2.7. Physics, Mathematics and Computer Science. The role of mathematics in the development of physics. Mathematics as the language of physics. Mathematical methods and formation of scientific knowledge. Three stages of knowledge mathematization: phenomenological, model, fundamental-theoretical.

"Co-evolution" of computing means and scientific methods. The concept of information: genesis and modern approaches. Matter, energy, information as fundamental categories of modern science. The problem of inclusion of the concept of information in physical picture of the world. Connection of information with the concept of entropy. The problem of describing information open systems. Quantum correlations and information. R. Feynman on the possibility of modeling physics on computers. Limitations on modeling quantum systems using the classical

	<p>computer. The concept of a quantum computer. Computing machines and the Church-Turing principle. Quantum complexity theory. Connections between the Church-Turing principle and branches of physics.</p>	
<p>Section 9.3. Philosophical problems of chemistry</p>	<p>Topic 9.3.1. The specifics of the philosophy of chemistry. Historical understanding of science as an essential component of the philosophical questions of chemistry. Close interaction of chemistry with physics, biology, geology and ecology. "Bridge" conceptual constructions of chemistry connecting these sciences. Direct connection of chemistry with technology and industry.</p> <p>Topic 9.3.2. Conceptual systems of chemistry and their evolution. Conceptual systems of chemistry as relatively independent systems of chemical concepts and as stages in the historical development of chemistry. The evolution of conceptual systems. The doctrine of the elements as historically the first type of conceptual systems, which was the theoretical basis for explaining the properties and distinctive features of substances. The ancient stage of the doctrine of the elements. R. Boyle and the scientific concept element. Early forms of the doctrine of the elements - phlogiston theory, iatrochemistry, pneumochemistry and Lavoisier's oxygen theory. The periodic system of Mendeleev as the final stage in the development of the doctrine of the elements. Structural chemistry as a theoretical explanation of the dynamic characteristics of matter - its reactivity. The emergence of structural theories in the process of development of organic chemistry (the study of isomers and polymers in works by Kolbe, Kekule, Cooper, Butlerov). Atomic-molecular theory as a theoretical basis for structural theories.</p> <p>Kinetic theories as theories of a chemical process that put on the agenda the study of the organization of chemical systems (their mechanism, kinetic factors, "cybernetics"). Chemical kinetics and the problem of the behavior of chemical systems. The concept of self-organization and synergetics as the basis for explaining the behavior of chemical systems.</p> <p>Topic 9.3.3. The trend of physicalization of chemistry. Three stages of physicalization: 1) penetration of physical ideas into chemistry, 2) construction physical and physico-chemical theories; 3) reduction of fundamental sections of chemistry to physics. Reduction of the theory of chemical bonding to quantum mechanics. Reduction and reductionism in chemistry. Reductionism and</p>	<p>L, S</p>

	<p>unity of knowledge. Gnoseological, pragmatic and ontological reductionism. Approximate methods in chemistry. The problem of meaning and meaning approximate methods as one of the central ones for the philosophy of chemistry.</p>	
<p>Section 9.4. Philosophical problems of geology</p>	<p>Topic 9.4.1. The place of geology in the genetic classification of sciences. Geological picture of the world as a reflection of geological reality. Features of the historical formation of a picture of geological reality. Formation of ideas about the systemic nature of the object of geology. The place of geology in the nonlinear genetic classification of sciences. Its relationship with the frontier sciences: physics and chemistry, on the one hand, and biology, geography and social sciences on the other. The place of geophysics and geochemistry in the composition of geological disciplines. Determination of the place of geology in the genetic classification of sciences</p> <p>- the methodological basis for the substantiation of geology itself as a science, the disclosure of the patterns of its internal division, the study of the relationship between the laws and methods of geology with the laws and methods of frontier sciences.</p> <p>Topic 9.4.2. The problem of space and time in geology. The meaning of the ordinary understanding of space and time in geology as the mutual arrangement of geological objects and processes and their successive changes relative to the scale of nowhere existing, evenly flowing time. Possible errors in determining the age of rocks by flora and fauna.</p> <p>Essence and properties of geological space and time. The presence of uneven-aged sections of the earth's crust as a sign of the existence of separate geological systems with a specific geological circulation of matter and specific forms of being - geological space and time.</p> <p>Topic 9.4.3. Geochemical doctrine of V.I. Vernadsky about the biosphere and noosphere. Introduction by V.I. Vernadsky in the scientific literature of a special geochemical principle of separating the earth's shells according to the main geological force that affects the chemical composition of the earth's shells and the migration of chemical elements. IN AND. Vernadsky about the Earth's biosphere as a set of upper layers of the lithosphere formed by organic sediments, the hydrosphere, the chemical composition of which largely depends on the activity of living organisms, the troposphere, whose oxygen is of secondary origin, and the "living matter" itself. The origin within the biosphere of mankind, which, on the basis of science and technology, remakes the biosphere into the noosphere. The existing boundaries of the biosphere: the</p>	<p>L, S</p>

	<p>impossibility of the existence of living things at high pressure and temperature inside the earth's crust and low pressure and temperature in the high layers of the atmosphere, with a hard cosmic radiation. IN AND. Vernadsky about transition from the biosphere to the noosphere. Noosphere as the highest stage in the development of the biosphere. Analysis environmental consequences of the complete transition of the biosphere into the noosphere.</p> <p>Topic 9.4.4. Geology and ecology. Different understanding of the geological environment and its role in society. Correlation of concepts "geological environment" and "geographical environment of human society". Correlation between biosphere and ecosphere. Object and subject of geoecology. Geoecology, its content and logical structure. Definition of the object and subject of ecological geology. Ecological functions of the lithosphere. Tasks ecological geology in substantiation of environmental management.</p>	
<p>Section 9.5. Philosophical problems of biology and ecology</p>	<p>Topic 9.5.1. The subject of the philosophy of biology and its evolution. The nature of biological knowledge. Essence and specificity philosophical and methodological problems biology. The main stages of the transformation of ideas about the place and role of biology in the system of scientific knowledge. Evolution in understanding the subject of biological science. Changes in research strategy activities in biology. The role of philosophical reflection in the development of the life sciences. Philosophy of biology in the study of the structure of biological knowledge, in the study of the nature, features and specifics of the scientific knowledge of living objects and systems, in the analysis of the means and methods of such knowledge. Philosophy of biology in assessing the cognitive and social role of the life sciences in modern society.</p> <p>Topic 9.5.2. Biology in the context of the philosophy and methodology of science of the XX century. The problem of descriptive and explanatory nature biological knowledge in the mirror of neo-Kantian opposition ideographic and nomothetic sciences (1920-1930s). Biology Through a Reductionist-Oriented Prism philosophy of science of logical empiricism (1940-1970s). Biology from the point of view of anti-reductionist methodological programs (1970-1990s). Problem "autonomous" status of biology as a science. The problem of "biological reality".</p>	<p>L, S</p>

The multiplicity of "images of biology" in modern scientific, biological and philosophical literature.

Topic 9.5.3. The essence of the living and the problem of its origin. The concept of life in modern science and philosophy.

Variety of approaches to the definition of life phenomenon. Correlation of philosophical and natural-scientific interpretation of life. The main stages in the development of ideas about the essence of the living and the problem of the origin of life. Philosophical analysis of the foundations of studies of the origin and essence of life.

Topic 9.5.4. The principle of development in biology. The main stages in the formation of the idea of development in biology. Structure and basic principles of evolutionary theory. Development of evolutionary ideas: first, second and third evolutionary syntheses. Problem of biological progress. The role of theory of biological evolution in the formation of the principles of global evolutionism.

Topic 9.5.5. From biological evolutionary theory to global evolutionism.

Biology and the formation of a modern evolutionary picture of the world. Evolutionary ethics as a study of population-genetic mechanisms of the formation of altruism in nature.

Adaptive nature and genetic conditioning of sociability. From altruism to moral standards, from sociability - to human society. The concepts of good and evil in the evolutionary-ethical perspective. Evolutionary epistemology as an extension of evolutionary ideas to the study of cognition. Prerequisites and stages of formation of evolutionary epistemology. Kantian a priori in the light of the biological theory of evolution. The evolution of life as the process of "knowledge". The problem of truth in the light of an evolutionary-epistemological perspective.

Evolutionary-genetic origin of aesthetic emotions. Higher aesthetic emotions in humans as a consequence of evolution based on natural selection.

Categories of art in bioaesthetic perspective.

Topic 9.5.6. The problem of system organization in biology. Organization and integrity of living systems. The evolution of ideas about organization and consistency in biology (based on the works of A.A. Bogdanov, V.I. Vernadsky, L. von Bertalanffy, V.N. Beklemisheva). The principle of consistency in the field of biological knowledge as a way to implement a holistic approach to an object in the conditions of the diverse differentiation of modern knowledge about living objects.

Topic 9.5.7. The problem of determinism in biology. The place of the targeted approach in biological research. The main directions of the discussion of the problem

determinism in biology: teleology, mechanical determinism, organic determinism, accidentalism, finalism. Determinism and indeterminism in the interpretation of life processes. A variety of forms of determination in living systems and their relationship. Essence and forms

biological teleology: a phenomenon "expediency" of the structure and functioning of living systems, purposefulness as a fundamental feature of the main life processes, functional descriptions and explanations in the structure of biological knowledge.

Topic 9.5.8. Impact of biology on the formation of new norms, attitudes and orientations of culture. Philosophy of life in the new paradigmatics of culture. The impact of modern biological research on the formation of new ontological explanatory schemes, methodological and epistemological attitudes, value orientations and activity priorities in the culture system. The need to create a new philosophy of nature that explores the patterns of functioning and interaction of various ontological explanatory schemes and models presented in modern science.

The role of biology in the formation of general cultural cognitive models of integrity, development, consistency, co-evolution.

Historical prerequisites for the formation bioethics. Bioethics in different cultural contexts. Basic principles and rules of modern biomedical ethics. Social, ethical, legal and philosophical problems of application of biological knowledge. The value of life in various cultural and confessional discourses.

Historical and theoretical background of the biological interpretation of power relations. Ethological and sociobiological foundations of modern biopolitical concepts. The main patterns of social behavior in the world

living organisms and in human society. Problems of power and power relations in the biopolitical perspective. Socio-philosophical analysis of the problems of biotechnology, gene and cellular engineering, cloning.

Topic 9.5.9. The subject of ecophilosophy. Ecophilosophy as a field of philosophical knowledge that studies the philosophical problems of the interaction of living organisms and systems with each other and with their environment.

The formation of ecology as an integral scientific discipline: from ecology

biological to human ecology, social ecology, global ecology. The transformation of environmental issues into the dominant worldview of modern culture.

Ecophilosophy as a reflection on the problems of the human environment, changes in attitude to the being of the person himself, transformation of social mechanisms.

Topic 9.5.10. Man and nature in the socio-cultural dimension. The main historical stages of interaction between society and nature. Genesis of ecological problems. Ecophilic and ecophobic motives of mythological consciousness. Ancient ecological thought. Ecological views of the Middle Ages and the Renaissance.

Ecological views of the Enlightenment. Ecological ideas of modern times.

Darwinism and ecology. The doctrine of the noosphere V.I. Vernadsky. New ecological accents of the 20th century: urban ecology, growth limits, sustainable development. Modern ideas about the need for a new world order as a way to solve global problems modernity and ensuring the transition to a sustainable development strategy.

Historical conditionality of the emergence of social ecology. The main stages in the development of socio-ecological knowledge.

The subject and tasks of social ecology, the structure of socio-ecological knowledge and its relationship with other sciences.

The specifics of the socio-ecological laws of social development, their relationship with traditional social laws.

Social ecology as a theoretical basis for overcoming the ecological crisis.

Topic 9.5.11. Ecological bases of economic activity. The specifics of human economic activity in the process of nature management, its main stages. Features of economic activities, taking into account the prospect of finite material resources of the planet. The main directions of the transformation of the production and consumer spheres of society in order to overcome environmental difficulties. Directions for changing the system of priorities and value orientations of people in an environmental crisis. Ways to overcome the finiteness of material resources with simultaneous progressive development of society.

Topic 9.5.12. Ecological imperatives of modern culture. The modern ecological crisis as a civilizational crisis: origins and trends. Directions of biosphere change in the process of scientific and technological revolution.

	<p>Principles of interaction between society and nature. Ways formation of ecological culture. Spiritual and historical foundations for overcoming the ecological crisis. Ethical prerequisites for solving environmental problems. Ecology and Ecopolitics. Ecology and law. Ecology and Economics. The concept of sustainable development in the context of globalization. Ecology and philosophy of information civilization. Critical analysis of the main scenarios of human eco-development: anthropocentrism, technocentrism, biocentrism, theocentrism, cosmocentrism, eccentricism. Change dominant regulators of culture and the formation of new constitutive principles under the influence of environmental imperatives. A new philosophy of interaction between man and nature in context of the concept of sustainable development of Russia.</p> <p>Topic 9.5.13. Education, upbringing and enlightenment in the light of the environmental problems of mankind. The role of education and upbringing in the process of personality formation.</p> <p>Peculiarities of ecological upbringing and education. The need to change the worldview paradigm as the most important condition for overcoming environmental danger. Scientific bases of ecological education. Features of the philosophical program "Paideia" in the context of the ecological crisis. The practical significance of environmental knowledge for prevention of dangerous destructive processes in nature and society. The role of mass media in environmental education, upbringing and enlightenment of the population.</p>	
<p>Section 9.6. Philosophical problems of medicine</p>	<p>Topic 9.6.1. Philosophy of medicine and medicine as a science. Philosophy as an ideological and general methodological basis of medicine.</p> <p>Ontological, epistemological and value-normative foundations of medicine. The relationship of philosophical and general scientific categories and concepts of medicine.</p> <p>Philosophy of medicine, its goals, objectives and main issues. The subject of the philosophy of medicine and its place in the development of medicine and health care.</p> <p>Genesis of philosophy medicine in the 20th century as a transition to a new stage in the understanding of biomedical and medical and social problems. Gnoseological and logical foundations of the philosophy of medicine, its norms and ideals. System structure of knowledge in the philosophy of medicine.</p> <p>The object and subject of medicine, the specificity of medicine as a science based on natural science and social and humanitarian knowledge.</p>	<p>L, S</p>

The specifics of the analysis of natural and social phenomena, as well as a person as a subject of medicine. Natural science and medicine. Philosophical and methodological aspects of interaction between medicine and biology.

Methodological foundations of general pathology like science. Psychology and medicine. Social sciences and medical knowledge.

Fundamental and applied research in medicine. Classification of medical sciences as a philosophical and methodological problem. General theory of medicine as an integration of natural science and socio-humanitarian knowledge. Differentiation and integration of medical knowledge. Medicine as a multidisciplinary system of knowledge.

Medicine as a science and art, theory and practice. Features of the development of medicine in the XX century. Specifics of knowledge in medicine, features of the subject, means, methods and goals. Comprehensive study of medical and scientific problems. Specificity of philosophical problems of prevention and clinical activity. Natural science and socio-humanitarian knowledge in medical theories in the light of the philosophy of medicine.

The main problems and principles of knowledge in philosophy of medicine. Philosophy of medicine as theory and method. Pluralism of directions in the philosophy of medicine, their socio-historical conditionality.

The philosophical and methodological function of the philosophy of medicine, its role in the development of medical knowledge.

Topic 9.6.2. Philosophical categories and concepts of medicine. Quantity, quality and measure, their methodological significance in philosophy of medicine. Measure and norm in medicine. The problem of change and development in modern philosophy of medicine. Quantitative methods and the problem of measurement in modern medicine. Determinism and medicine. The problem of causality (etiology) in medicine. Criticism of teleology and indeterminism. Methodological analysis of monocausalism and conditionalism in medicine. Problems of etiology in the anatomical and morphological, physiological and functional aspects. The problem of mono- and polyetiology of diseases, its methodological meaning. Dialectics of general and specific, external and internal in medicine.

Structural-functional relationships in medicine. Dialectics of general and local in pathology. Categories "whole" and "part", "structure" and "function" in medicine. Dialectics and systems approach in medicine.

Topic 9.6.3. Consciousness and knowledge. Reflection theory and modern scientific ideas about the evolution of forms of reflection in living nature. Reflection, activity, knowledge. Methodological significance of the reflection theory for medicine. Brain and psyche.

Origin and essence of consciousness. Consciousness as the highest form of mental reflection of reality. The problem of the ideal. The problem of consciousness and mental activity in the norm and in pathology. Correlation of physiological and mental in medicine. Reflection, its cognitive and value aspects. Dialectics of the process of cognition. The unity of the sensual and the rational in cognition. Empirical and theoretical knowledge in medicine. Empiricism and the problem theoretical loading of empirical knowledge. Problems of the criterion of truth in philosophy and medicine. Accuracy as one of the foundations of the truth of knowledge in medicine. Problems of logical-mathematical and semantic accuracy of knowledge in medicine.

The concept of the method of cognition. Ratio philosophical, general scientific and concrete scientific methods in medicine. Fact and scientific problem. Hypothesis and scientific theory, their logical structure and cognitive function in medicine. Experiment and modeling, their role in medical knowledge. The increasing role of the device in medicine. Methodological problems of measurements in medicine. Diagnostics as a specific cognitive process. Alternative and complementarity of clinical-nosological and existential-anthropological approaches in diagnostics. Clinical diagnosis.

Topic 9.6.4. Socio-biological and psychosomatic problems. Philosophical aspects of the socio-biological problem. Dialectics of social and biological in human nature. Medicine and social biological problem: empirical and theoretical relationship of medicine with biology and social sciences and humanities in the study of the norm and pathology, health and disease, public health and morbidity. Socio-biological conditionality of human health and disease. The problem of reductionism in modern medicine. Development of qualitatively different principles of medicine in relation to life and death in general and human in particular. Philosophical aspects of the psychosomatic problem. Psychosomatic approach in modern medicine.

Topic 9.6.5. The problem of norms, health and illness. Philosophical and social aspects of the doctrine of the norm, health and disease.

	<p>Philosophical and methodological problems of nosology. Nosological unit as an empirical and theoretical concept. Antinosophism. Methodological analysis of the concepts of "norm" and "pathology", "health" and "disease". Disease and pathological process. The problem of the "level" of pathology in the knowledge of the norm and the disease. Biological and social aspects of the norm, health and disease. Health and disease, their place in system of social values of a person and society. Health and morbidity. Social etiology of health and disease. Diseases of Civilization. Illness and personality sick. Study of people's attitude to life and death in crisis conditions. The concepts of public health and morbidity, their methodological analysis. The health of the population as an indicator of its social and economic well-being. Methodological problems of humanization of medicine and public health. Healthy lifestyle: essence and methodological approaches to its study. Bioethics is the science of the inherent value of life, the basis for the development of a new moral and ethical system, human relationships and relationships. The content of bioethics: the morality of experiments on humans, the reasons for suicide or refusal of patients from treatment for vital indications, the problems of euthanasia, abortion, new reproductive technology, organ and tissue transplantation, medical genetics, genetic engineering, psychiatry, the rights of the mentally ill, social justice in the new ideology and policy in the field healthcare. Topic 9.6.6. Rationalism and scientific character of medical knowledge. Structure theoretical knowledge in medicine: problem, hypothesis, law, theory, multidisciplinary synthesis. Ideals of scientific character of modern medical knowledge. Methodological problems of the analysis of medical "ontological reality" in various paradigms: East - West, humoralism - scientific disciplinary units of knowledge - multidisciplinary synthesis. Modern trends in the development of medical knowledge: from classical rationalism to modern post-non-classical (multidisciplinarity, synergetics, etc.) vision of the object and subject of medicine.</p>	
<p>Section 9.7. Philosophical problems of technology.</p>	<p>Topic 9.7.1. Philosophy of technology and methodology of technical sciences. The specificity of the philosophical understanding of technology and technical sciences. Subject, main areas and main task philosophy of technology. Correlation between the philosophy of science and the philosophy of technology.</p>	<p>L, S</p>

What is technique? The problem of the meaning and essence of technology: "technical" and "non-technical". Practical-transformative (subject-gun) activity, technical and engineering activities, scientific and technical knowledge. Cognition and practice, research and design. Images of technology in culture: traditional and project culture. Prospects and boundaries of modern technogenic civilization.

Technical optimism and technical pessimism: an apology and cultural criticism of technology. Stages of rational generalization in technology: private and general technologies, technical sciences and systems engineering. Basic concepts of the relationship between science and technology. Principles of historical and methodological consideration; features of the methodology of technical sciences and design methodology.

Topic 9.7.2. Technology as a subject of natural science research. Formation of a technically prepared experiment; nature and technique, "natural" and "artificial", scientific technique and technique of science. The role of technology in the development of classical mathematical and experimental natural sciences and in modern non-classical natural sciences.

Topic 9.7.3. Natural and technical sciences. Specificity of technical sciences, their relation to natural and social sciences and mathematics. The first technical sciences as applied natural science.

The main types of technical sciences. The specifics of the correlation between theoretical and empirical in technical sciences, features of the theoretical and methodological synthesis of knowledge in technical sciences - technical theory: specific structure, features of functioning and stages formations; conceptual and mathematical apparatus, features ideal objects of technical theory; abstract-theoretical - private and general - schemes of technical theory; functional, flow and structural theoretical schemes, the role of engineering practice and design, constructive-technical and practical-methodological knowledge. Disciplinary organization of technical science: the concept of scientific and technical disciplines and families of scientific and technical disciplines. Interdisciplinary, problem-oriented and project-oriented research.

Topic 9.7.4. Features of non-classical scientific and technical disciplines. Differences between modern and classical scientific and technical disciplines; nature and essence of modern (non-classical) scientific and technical

disciplines. Parallels between non-classical natural science and modern (non-classical) scientific and technical disciplines. Features of theoretical research in modern scientific and technical disciplines: system-integrative trends and interdisciplinary theoretical synthesis, strengthening the theoretical dimension of technology and developing a new way of mathematization of science through the use of information and computer technologies, blurring the boundaries between research and design, the formation of a new image of science and the norms of technical action under the influence of environmental threats, the role of the methodology of social and humanitarian disciplines and attempts to apply social and humanitarian knowledge in the field of technology. Development of systemic and cybernetic concepts in technology. System research and system design: features of system engineering and sociotechnical design, the possibility and danger of social design.

Topic 9.7.5. Social evaluation of technology as an applied philosophy of technology. Scientific and technical policy and the problem of managing the scientific and technological progress of society.

Sociocultural problems of technology transfer and innovation. The problem of a comprehensive assessment of the social, economic, environmental and other consequences of technology; social evaluation of technology as a field of study of systems analysis and as a problem-oriented study; interdisciplinarity, reflexivity and project orientation of research into the consequences of technology. The ethics of the scientist and the social responsibility of the designer: types of responsibility, moral and legal aspects of their implementation in society. Scientific, technical and economic ethics and problems of environmental protection. Problems of humanization and ecologization of modern technology.

Social and environmental expertise of scientific, technical and economic projects, environmental impact assessment and environmental management at the enterprise as specific mechanisms for the implementation of scientific, technical and environmental policy; their correlation with the social evaluation of technology. Criteria and new understanding of scientific and technological progress in the concept of sustainable development: limited forecasting of scientific and technological development and scenario approach, scientific and technical rationality and irrational consequences of scientific and technological progress; capabilities risk management and the need to make decisions in conditions of incomplete knowledge; experts and the

	<p>public — the right of citizens to participate in decision-making and the problem acceptance by the population of the scientific and technical policy of the state.</p>	
<p>Section 9.8. Philosophical problems of informatics</p>	<p>Topic 9.8.1. The history of the formation of informatics as an interdisciplinary direction in the second half of the 20th century. Information theory of K. Shannon. Cybernetics N. Wiener, R. Ashby, W. McCulloch, A. Turing, J. Bigelow, J. von Neumann, G. Bateson, M. Mead, A. Rosenbluth, W. Pitts, S. Veer. General systems theory L. von Bertalanffy, A. Rapport. V. Bush's concept of hypertext. Constructive cybernetic epistemology of H. von Foerster and V. Turchin. Synergetic approach in informatics. G. Haken and D.S. Chernavsky. Informatics in the context of post-non-classical science and ideas about developing human-dimensional systems.</p> <p>Topic 9.8.2. Informatics as an interdisciplinary science of functioning and development information and communication environment and its technologization through computer technology. Modeling and computational experiment as an intellectual core informatics. The constructive nature of informatics and its synergetic co-evolutionary meaning. The relationship between artificial and natural in computer science, neurocomputing, processors of J. Hopfield, S. Grossberg, analogy between thinking and pattern recognition.</p> <p>The concept of information security: the humanitarian component. The problem of reality in computer science. Virtual reality. The concept of information and communication reality as interdisciplinary integrative concept.</p> <p>Topic 9.8.3. The Internet as a metaphor for the global brain. concept cyberspace Internet and its philosophical meaning. Synergetic paradigm of "order and chaos" on the Internet. Observability, fractality, dialogue.</p> <p>Internet Addiction Phenomenon. Internet as an instrument of new social technologies. Internet as information communicative environment of science of the XXI century. And How global environment of continuous education.</p> <p>Topic 9.8.4. Epistemological content of the computer revolution. Concept information epistemology and its connection with cybernetic epistemology.</p> <p>Computer ethics, knowledge engineering problems of intellectual property. Technological approach to the study of knowledge. The problem of artificial intelligence and its evolution.</p>	<p>L, S</p>

	<p>Topic 9.8.5. Social informatics. The concept of the information society: from P. Sorokin to E. Castells. The origin of information societies. Synergetic approach to the problems of social informatics. Information dynamics of organizations in society. Network society and tasks of social informatics. The problem of personality in the information society. Modern psychotechnologies and psychotherapeutic practices of counseling as an integral part of modern socio-humanitarian informatics.</p>	
<p>Section 9.9. Philosophy and social and humanitarian knowledge.</p>	<p>Topic 9.9.1. Philosophy as integral a form of scientific knowledge, including knowledge about society, culture, history and man (Plato, Aristotle, Kant, Hegel, Hobbes, Locke, etc.). Pre-scientific, non-scientific and extra-scientific knowledge about society, culture, history and man. Formation of scientific disciplines of the social and humanitarian cycle: empirical information and historical and logical reconstructions. Sociocultural conditionality of the disciplinary structure of scientific knowledge: sociology, economics, political science, the science of culture as a reflection in the knowledge of the relative independence of individual spheres of society. The dependence of SGBV on the social context: classical, non-classical and post-non-classical science. SGB as a phenomenon that originated in the West, its universal significance. Russian the context of the application of social knowledge and the change of its paradigms.</p> <p>Topic 9.1.2. The specificity of the object and subject of social and humanitarian knowledge. Similarities and differences between natural sciences and social sciences: modern interpretations of the problem. Features of society and man, his communications and spiritual life as objects of knowledge: diversity, uniqueness, uniqueness, chance, variability. Convergence of natural-science and social-humanitarian knowledge in non-classical science, evolution and mechanisms of interaction. Humanization and humanitarization of modern natural science. Ability to apply mathematics and computer modeling in the SGN. Scientific picture of the world in social sciences and humanities.</p> <p>Topic 9.1.3. The subject of social and humanitarian knowledge. The individual subject form of existence. The inclusion of the consciousness of the subject, his system of values and interests in the object of study of the SGB. Personal implicit knowledge of the subject. Individual and collective the unconscious in the humanities. Collective subject, its forms of existence. The scientific community as a subject</p>	<p>L, S</p>

of knowledge. Communicative rationality. The role of traditions, values, models of interpretation and "pre-reasons" (Gadamer) in intersubjective understanding and meaning.

Topic 9.1.4. The nature of values and their role in social and humanitarian knowledge. I. Kant: dialectic of theoretical and practical (moral) reason. Methodological functions of "prerequisite knowledge" and regulatory principles in science. Explicit and implicit value prerequisites as a consequence of the communicative nature of the SGN.

Value judgments in science and the need for "value neutrality" in social research. Principles of the "logic of social sciences" by K. Popper. The role of the scientific picture of the world, the style of scientific knowledge, philosophical categories and principles, ideas of common sense in the research process of social humanities. Extra-scientific criteria: principles of beauty and simplicity in social and humanitarian knowledge.

Topic 9.1.5. Life as a category of sciences society and culture. Understanding life for beyond its biological meanings. Sociocultural and humanitarian content of the concept of life (A. Bergson, V. Dilthey, philosophical anthropology). Limited application of natural science methods, causal schemes. Cognition and "experience" of life - the main content artistic works. History is one of the forms of manifestation of life, the objectification of life in time, a never-ending whole (H. Simmel, O. Spengler, E. Husserl, and others).

Topic 9.1.6. Time, space, chronotope in social and humanitarian knowledge. The difference between time as a parameter of physical events and time as a general condition and measure of the formation of human existence, the realization of life. Objective and subjective time. Social and cultural-historical time.

Rethinking the categories of space and time in a humanitarian context (MM Bakhtin).

Introduction of the concept of chronotope as a specific unity of spatio-temporal characteristics. Peculiarities "artistic chronotope".

Topic 9.1.7. Communicativity in the Sciences of Society and Culture: Methodological Consequences and Imperatives. The birth of knowledge in the process of interaction of "communicating individuals". Communication (communication of scientists) as a condition for the creation of a new social and humanitarian knowledge and an expression of the socio-cultural nature of scientific knowledge. Scientific conventions (agreements,

agreements) as a necessity and a consequence of the communicative nature of knowledge. The moral responsibility of the scientist for the introduction of conventions. Indoctrination - the introduction, dissemination and "suggestion" of a doctrine as one of the consequences of communication science.

Topic 9.1.8. The problem of truth and rationality in the social sciences and the humanities. Rational, objective, true in SGN. Classical and non-classical concepts of truth in SGN. Existential truth, truth and truth. The problem of truth in light of the practical application of SGB. Pluralism and the sociological demand for no monopoly on truth. Relativism, psychologism, historicism in SGN and the problem of truth.

Topic 9.1.9. Explanation, understanding, interpretation in the social and human sciences. Explanation and understanding of how a consequence of the communicative nature of science. The nature and types of explanations. Explanation is a function of theory. Understanding in the humanities, the need to turn to hermeneutics as an "organon of sciences about the spirit" (V. Dilthey, G.-G. Gadamer). The specificity of understanding: it cannot be represented by formulas of logical operations, it requires an appeal to the whole person, his life, experience, language and history. Hermeneutics is the science of understanding and interpreting a text. Text as a special reality and "unit" of methodological and semantic analysis of social and humanitarian knowledge. Language, "language games", language picture of the world. Interpretation as giving meanings, meanings to statements, texts, phenomena and events is a general scientific method and a basic operation of social and humanitarian knowledge. The problem of "historical distance" "temporal separation" (Gadamer) in interpretation and understanding. Explanation and understanding in sociology, historical, economic and legal sciences, psychology, philology, cultural studies.

Topic 9.1.10. Faith, doubt, knowledge in social sciences and humanities. Faith and knowledge, certainty and doubt, the rootedness of faith as a "form of life" (L. Wittgenstein) in pre-conceptual structures. The dialectic of faith and doubt. "Embedded" subjective faith in all processes of cognition and life, the hidden, latent nature of beliefs as empirical ideas and judgments. The constructive role of faith as a condition of "being among people" (L. Wittgenstein).

	<p>Faith and beliefs are essential components and foundations of personal knowledge, the result of sensory processes, social experience, "patterns" and attitudes, tested in culture. Faith and understanding in the context of communications. Faith and truth. Different types of justification of faith and knowledge. Joint consideration of faith and truth is a tradition rooted in European philosophy. "Philosophical faith" as the faith of a thinking person (K. Jaspers).</p> <p>Topic 9.1.11. Basic research programs of social sciences and humanities. naturalistic research program. anti-naturalistic research program. General scientific significance of naturalistic and anti-naturalistic research programs. Naturalistic and anti-naturalistic research programs in sociology, historical, economic and legal sciences, psychology, philology, cultural studies.</p> <p>Topic 9.1.12. The division of SGB into social and human sciences. The problem of separation of social and human sciences (according to subject, method, subject and method at the same time, research programs). Methods of social and human sciences. Extra-scientific social knowledge. The difference between the humanities and non-scientific knowledge. Interaction of social sciences, humanities and non-scientific knowledge in the examinations of social projects and programs.</p> <p>Topic 9.1.13. "Knowledge Society". Disciplinary structure and the role of social sciences and humanities in the process of social transformations. The disciplinary structure of social and humanitarian knowledge and interdisciplinary research. Changes in the disciplinary structure of the SGN, which developed in the 19th century. Change of leading disciplines. Redefinition of paradigms and themes, emergence of new fields of study. The growing role of knowledge in society. "Knowledge Society". Participation of SSS and non-scientific knowledge in the examinations of social projects and programs. The Importance of Advanced Social Research for Solving Social Problems and Prevention social risks.</p>	
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6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Technical equipment for the discipline

Audience type	Audience equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if needed)
Lecture	An auditorium for lecture-type classes,	Computer classroom equipped with 25 workstations with a personal computer,

	equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentations.	specialized software for laboratory work and practical lessons
Seminar	An auditorium for conducting seminar-type classes, group and individual consultations, current control and intermediate certification, equipped with a set of specialized furniture and technical means for multimedia presentations.	Computer classroom equipped with 25 workstations with a personal computer, specialized software for laboratory work and practical lessons
Individual work	An auditorium for independent work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to the EIES.	

7. RECOMMENDED SOURCES FOR COURSE STUDIES

a) software:

- space mission general analysis software GMAT;
- low level space dynamics library Orekit;
- flight simulator and information support program (MIOP);
- software development tools Python, C++, etc.

b) databases, reference and information, and search systems:

- electronic fund of legal, and normative and technical documentation <http://docs.cntd.ru/>;
- search system Yandex <https://www.yandex.ru/>;
- search system Google <https://www.google.ru/>;
- abstract database SCOPUS <http://www.elsevierscience.ru/products/scopus/>.

a) Main reading(sources)

1. Степин Вячеслав Семенович. Философия и методология науки. Избранное [Текст/электронный ресурс] / В.С. Степин. - Электронные текстовые данные. - М.: Академический проект : Альма Матер, 2015. - 716 с. - (Философские технологии: Избранные философские труды). <http://lib.rudn.ru/ProtectedView/Book/ViewBook/6753>
2. Мархинин Василий Васильевич. Лекции по философии науки [Электронный ресурс]: Учебное пособие / В.В. Мархинин. - М. : Университетская книга, 2016. - 428 с. <http://lib.rudn.ru/ProtectedView/Book/ViewBook/6068>

1. Гнатик Е.Н. Философские проблемы астрономии и космологии [Электронный ресурс]: Учебно-методическое пособие по дисциплине "Философские проблемы естественнонаучных, технических и гуманитарных наук" / Е.Н. Гнатик. - Электронные текстовые данные. - М.: Изд-во РУДН, 2018. – 56 с.
<http://lib.rudn.ru/ProtectedView/Book/ViewBook/6492>
2. Гнатик Е.Н. Философские проблемы геологии [Электронный ресурс] : Учебно-методическое пособие по дисциплине "Философские проблемы естественнонаучных, технических и гуманитарных наук" / Е.Н. Гнатик. - Электронные текстовые данные. - М.: Изд-во РУДН, 2018. - 32 с.
<http://lib.rudn.ru/ProtectedView/Book/ViewBook/6493>
3. История и философия науки (Философские науки) [Текст/электронный ресурс]: Учебно-методическое пособие для подготовки к кандидатскому экзамену / Сост. С.А. Лохов; Под ред. В.М. Найдыша. - Электронные текстовые данные. - М.: Изд-во РУДН, 2013. - 95 с.
<http://lib.rudn.ru/ProtectedView/Book/ViewBook/3932>
4. Мамченков Дмитрий Валерьевич. Философия техники [Текст/электронный ресурс]: Учебно-методическое пособие / Д.В. Мамченков. - Электронные текстовые данные. - М.: Изд-во РУДН, 2013. - 47 с.
<http://lib.rudn.ru/ProtectedView/Book/ViewBook/3130>
5. Мартышин Орест Владимирович. Философия права: Учебник для магистров / О.В. Мартышин. - М.: Проспект, 2017. - 352 с.
6. Орехов Андрей Михайлович. Философия социологии: взгляд со стороны социальной философии // Вестник Российского университета дружбы народов: Философия. - 2017. - № т. 21 (4). - С.565 - 571.
<http://journals.rudn.ru/philosophy/article/view/17667/15373>

Internet-(based) sources:

1. RUDN ELS and third-party ELS, to which university students have access on the basis of concluded agreements:
 - RUDN Electronic Library System - RUDN ELS
<http://lib.rudn.ru/MegaPro/Web>
 - ELS "University Library Online" <http://www.biblioclub.ru>
 - ELS Uright <http://www.biblio-online.ru>
 - ELS "Student Advisor" www.studentlibrary.ru
 - ELS "Lan" <http://e.lanbook.com/>
 - ELS "Trinity Bridge"
 -
2. Databases and search engines:
 - electronic fund of legal and normative-technical documentation
<http://docs.cntd.ru/>
 - Yandex search engine <https://www.yandex.ru/>
 - Google search engine <https://www.google.ru/>
 - abstract database SCOPUS <http://www.elsevierscience.ru/products/scopus/>
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Educational and methodological materials for independent work of students in the course of mastering the discipline/module:*

7. EVALUATION MATERIALS AND SCORE-RATING SYSTEM FOR ASSESSING THE LEVEL OF FORMATION OF COMPETENCES IN THE DISCIPLINE

In accordance with the requirements of the EP HE RUDN University, for attestation of students for compliance of their personal achievements with the planned discipline learning outcomes, assessment tools funds have been created (VF is presented in Annex 1).

The teacher has the right to change the number and content of assignments given to students (student), based on the contingent (their level of preparedness).

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