

*Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
(RUDN University)*

Institute of Environmental Engineering

COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management


Higher education program

Управление природопользованием

Course title	<i>Certification of raw materials, production processes and products in accordance with international environmental requirements/ Сертификация сырья, производственных процессов и продукции по международным экологическим требованиям /</i>	
Course Workload	3 ECTS (108 ac.h.)	
<i>Course modules and contents</i>		
№	Course modules	Contents
1.	Introduction	Product quality management and instruments of its organization. Factors of product quality.
2.	International standards and procedures of product quality management	International standards and procedures of product quality management. Best practices of implementation
3	Certification procedures	Procedures for the certification of product quality. Systems of certification. International practice. Russian experience.
4	Environmental certification	Requirements to the product quality. Laboratories. Analytical procedures.

The program is compiled in accordance with the requirements of the educational standard of higher education of the RUDN

DEVELOPER:


Professor of the ESandPQM
Department

Должность, БУП

Redina M.M.

Фамилия И.О.

HEAD OF THE DEPARTMENT:

Director of the ESandPQM
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Наименование БУП



Подпись

Savenkova E.V.

Фамилия И.О.

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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>Comprehensive assessment of natural and industrial potentials of territories / Комплексная оценка природных и производственных потенциалов территорий /</i>
Course Workload		3 ECTS (108 ac.h.)
<i>Course modules and contents</i>		
№	Course modules	Contents
1.	General patterns of assessment of natural resource potential	<p>Introduction to the discipline. The history of the development of the Earth's natural resources. The relationship between the level and type of economic development and the degree of development of the resource base. Regional patterns of allocation of energy resources are the basis for the development of the modern economy. Potential of alternative types of energy resources</p> <p>The mineral resource base of the modern economy. Problems of depletion of reserves and technologies of waste-free extraction of mineral resources</p> <p>Forest resources of the world. Ecological problems of forest use</p> <p>Climate resources and modern agriculture. Economic consequences of global warming.</p> <p>Land resources. Their depletion, problems of desertification and population increase. The consequences of urbanization.</p> <p>The world Ocean as a source of natural resources</p> <p>General issues of economic assessment of natural resource potential</p> <p>Accounting and evaluation systems for certain types of resources.</p>
2.	Regional features of natural resource potential assessment	<p>Natural resource potential of European countries</p> <p>Natural resource potential of North American countries</p> <p>Natural resource potential of Latin American countries</p> <p>Natural resource potential of African countries</p> <p>Natural resource potential of Asian countries</p> <p>Natural resource potential of the countries of certain regions</p>

		of Russia.
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The program is compiled in accordance with the requirements of the educational standard of higher education of the RUDN

DEVELOPER:

Professor of the ERNM
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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management


Higher education program

Управление природопользованием

Course title		<i>Ecology and public health / Экология и здоровье населения /</i>
Course Workload		2 ECTS (72 ac.h.)
<i>Course modules and contents</i>		
№	Course modules	Contents
1.	Introduction to the discipline	The history of the development of endoecology. The concept of endoecology. The main provisions of the endoecological law. The volume of fluid in different body environments: extracellular fluid and lymph, intracellular fluid, blood plasma. The concept of homeostasis. Links of humoral transport. The circulatory system. Extravascular tissues. Barrier and customs functions of the cell habitat. Morphofunctional base of general clinical lymphology, endoecology and endoecological rehabilitation. The metabolic role of the lymphatic system. Mechanisms of lymph transport. The role of the lymphatic system in the pathogenesis of diseases of civilization (atherosclerosis, tumor process). External influences on lymphatic drainage. Violations of tissue fluid transport.
2.	Endotoxycosis.	Mechanisms of lymph transport disorders. Violations of the function of the lymph nodes. VGT and LD under extreme conditions: overheating and hypothermia, dehydration, blood loss, anesthesia. The effect of chemicals (on the example of drugs) on the rate of lymphatic drainage. Dependence on the concentration of the substance
3	Methods for assessing the state of the environment and the forecast of a possible threat to human health	Methods for assessing the state of the environment and the forecast of a possible threat to human health. Review of methods for restoring health.
4	Substantiation of the basic principles and methods of human ecology	Substantiation of the basic principles and methods of human ecology. Hygienic rationing. Modern research on the level of public health. Healthy lifestyle skills and environmental culture

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SUMMARY OF THE DISCIPLINE

Educational program

05.04.06 Ecology and nature management

Master's program "Economics of natural resources management"

Name of the discipline	Ecologic-economical aspects of environmental projects
Number of credits (hours)	6 (216)
Content of the discipline	
Units of the discipline	Summary of units
Introduction	Projects. Environmental design concept. Stages of development and implementation of the project / Feasibility study of projects. The composition of the feasibility study. Requirements for the content of sections of the feasibility study. Environmental justification of investment projects. The concept of environmental support of economic activities
Economic efficiency of investment projects	Methods for assessing the economic efficiency of investment projects. Performance indicators. Taking into account the time factor. The concept of project sustainability and its role in investment decisions
Environmental support of economic activities at the pre-project stage	Environmental support of economic activities at the pre-project stage. Basic documentation. Expertise of projects and ecological justification of projects. The concept of EIA as part of project documentation
Environmental support during the construction phase	Environmental support during the construction phase of the facility. Environmental impacts during construction of facilities and environmental optimization
Environmental support on the stages of operation and liquidation	The stage of operation of facilities and the stage of liquidation (completion of the project): the main types of environmental impact. Procedures and documentation for environmental support of economic activities.

Developers:

Professor of the Department
of environmental safety
and product quality management

M.M. Redina

подпись

Head of the program

Professor of the Department
of environmental safety
and product quality management
название кафедры

M.M. Redina

инициаль > фамилия

подпись

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Institute of Environmental Engineering

COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>Geochemical methods of environmental assessment/ Геохимические методы оценки окружающей среды /</i>
Course Workload		2 ECTS (72 ac.h.)
<i>Course modules and contents</i>		
№	Course modules	Contents
1.	Introduction.	The subject, content and tasks of ecology and geochemistry of urban landscapes. The subject of study, tasks and role of ecology and geochemistry of urban landscapes in the ecology of the city. The role of landscapes in the ecology of the city.
2.	Elementary landscapes of urbanized territories.	Elementary landscapes. Three main groups of elementary landscapes (facies): eluvial, subaqual, supraqual. Additional facies groups.
3	Local landscapes (localities) of urbanized territories and principles of their typology	Definition of concepts, indexes of local landscapes. Their main characteristics. Geochemical characteristics.
4	Geochemical principles of ecological and geochemical systematics of cities	The main taxonomic units of geochemical systematics of cities. Detachments, ranks, groups and types, families, classes, genera of cities
5	Ecological and geochemical assessments of the state of urban pollution	Ecological and geochemical assessments of the state of urban pollution Ecological and geochemical assessments of the state of urban pollution.
6	Research methods. Field landscape and geochemical studies.	Research methods. Field landscape and geochemical studies. Processing of field research materials: Processing of analytical data. Landscape-geochemical maps.

The program is compiled in accordance with the requirements of the educational standard of higher education of the RUDN

DEVELOPER:

Docent of the RNM Department

Aleinikova AM.

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Higher Education Field 05.04.06 Ecology and nature management

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Управление природопользованием

Course title		<i>Environmental design of industrial facilities /Экологическое проектирование промышленных объектов /</i>
Course Workload		3 ECTS (108 ac.h.)
<i>Course modules and contents</i>		
№	Course modules	Contents
1.	Introduction	Projects. Environmental design concept. Stages of development and implementation of the project / Feasibility study of projects. The composition of the feasibility study. Requirements for the content of sections of the feasibility study. Environmental justification of investment projects. The concept of environmental support of economic activities
2.	Economic efficiency of investment projects	Methods for assessing the economic efficiency of investment projects. Performance indicators. Taking into account the time factor. The concept of project sustainability and its role in investment decisions
3	Environmental support of economic activities at the pre-project stage	Environmental support of economic activities at the pre-project stage. Basic documentation. Expertise of projects and ecological justification of projects. The concept of EIA as part of project documentation
4	Environmental support during the construction phase	Environmental support during the construction phase of the facility. Environmental impacts during construction of facilities and environmental optimization
5	Environmental support on the stages of operation and liquidation	The stage of operation of facilities and the stage of liquidation (completion of the project): the main types of environmental impact. Procedures and documentation for environmental support of economic activities.

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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

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Управление природопользованием

Course title		<i>International collaboration</i>
Course Workload		2 ECTS (72 ac.h.)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Introduction	<p>General ideas about the necessity and methods of implementing international cooperation in the field of nature protection Absolute dependence of man on flora and fauna.</p> <p>The biosphere as a human habitat that has no state borders.</p> <p>The necessity and contradictory nature of international cooperation in the protection and rational use of flora and fauna.</p> <p>The main forms of international cooperation in the field of environmental protection and nature management. International cooperation in the field of wildlife protection and nature management, as a compromise of nature management. The main mechanisms of international cooperation.</p>
2.	Examples of the implementation of international cooperation	<p>Examples of the implementation of international cooperation in the field of nature protection on the example of the main global conventions. Rio Declaration on Environment and Development. The UN Framework Convention on Climate Change. The UN Convention on Biological Diversity.</p> <p>The Kyoto Protocol as an implementation of the UN Framework Convention on Climate Change.</p> <p>UNESCO, United Nations Educational, Scientific and Cultural Organization. UNESCO Program "Man and the Biosphere" (MAB).</p> <p>The Rome Convention.</p> <p>International trade in endangered species of wild fauna and flora as one of the main factors in reducing species diversity.</p> <p>plants and animals on planet Earth (CITES Convention). Berne Convention.</p>
3	International governmental non-	International non-governmental environmental organizations and their role in international cooperation in

	environmental organizations	the field of OS protection International Whaling Commission (IWC). International Union for Conservation of Nature (IUCN). World Wildlife Fund (WWF)
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Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>International Environmental Quality Management Standards/ Международные стандарты управления качеством окружающей среды /</i>
Course Workload		3 ECTS (108 ac.h.)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Introduction	Modern problems of nature management. Environmental norms and standards as a base for the efficient nature management
2.	Environmental norms and regulations for the atmosphere protection	Factors of the pollution and self-purification of the atmosphere. Main models of the atmosphere pollution. Norms of the atmospheric quality: approaches to the setting of norms and examples. Regulation of the atmospheric pollution
3	Environmental norms and regulations for the protection of water quality	Factors of the pollution and self-purification of the water bodies. Basic models of the pollution of water flows: the Russian experience. Norms of water quality
4	Environmental norms and regulations for the protection of soil	Soil quality standards: approaches to justification of norms, types of norms, examples
5	Environmental norms and regulations in the waste management	Pyramid of the waste management. Waste as the "secondary resources": recycling and "waste to energy" technologies. Norms for the assessment of the waste danger. Norms of the waste formation, accumulation, storage and processing

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DEVELOPER:

Professor-consultant of the
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Наименование БУП

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**HEAD OF THE
HIGHER EDUCATION PROGRAM:**
Professor of the ESandPQM
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Redina M.M.

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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>IT in ecology and nature management</i>
Course Workload		3 ECTS (108 academic hours)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Introduction. Application of computer technologies in the work of an ecologist	Computational methods for assessing environmental impact, risk assessment, etc. Application of computer tools (Excel) for economic and environmental calculations. Specialized programs for complex calculations for environmental impact assessment, risk analysis. Graphics processing software
2.	Primary processing of statistical data in Excel	Distribution characteristics, their interpretation and methods of finding them in a given sample. Compilation of interval series and determination of characteristics for a series. Visualization of statistical data
3	Assessment of the characteristics of the general population. Observation errors	Observation errors and confidence intervals for characteristics of large and small samples. Determination of the required sample size
4	Testing statistical hypotheses	Statistical hypotheses and their application to solving real problems. Parametric criteria and conditions for their application. Testing the hypothesis about the distribution law. Comparison of two samples by mean value and comparison of variances of two samples using parametric tests. Nonparametric tests. Computing consistent ranks. Comparison of two samples by the mean and comparison of variances of two samples using nonparametric tests. Data consistency assessment.
5	ANOVA	Comparison of averages in more than two objects. Analysis of variance. Nonparametric ANOVA
	Correlation-regression analysis	Statistical connection and methods of its study. Correlation coefficient: graphical assessment, Pearson, Spearman, Kendall coefficients. Linear regression analysis. Pairwise linear regression. Multiple Linear Regression. Non-linear regression models. Correlation ratio
	Time series analysis	Dynamic (time) series, their classification, structure, tasks and conditions of study.

		Indicators of the analysis of the series of dynamics. Time series trend analysis. Making forecasts. Revealing seasonal irregularities in time series
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The program is compiled in accordance with the requirements of the educational standard of higher education of the RUDN

DEVELOPER:

Docent of the ESandPQM
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Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>IT in ecology and nature management</i>
Course Workload		4 ECTS (144 academic hours)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Introduction. Application of computer technologies in the work of an ecologist	Computational methods for assessing environmental impact, risk assessment, etc. Application of computer tools (Excel) for economic and environmental calculations. Specialized programs for complex calculations for environmental impact assessment, risk analysis. Graphics processing software
2.	Primary processing of statistical data in Excel	Distribution characteristics, their interpretation and methods of finding them in a given sample. Compilation of interval series and determination of characteristics for a series. Visualization of statistical data
3	Assessment of the characteristics of the general population. Observation errors	Observation errors and confidence intervals for characteristics of large and small samples. Determination of the required sample size
4	Testing statistical hypotheses	Statistical hypotheses and their application to solving real problems. Parametric criteria and conditions for their application. Testing the hypothesis about the distribution law. Comparison of two samples by mean value and comparison of variances of two samples using parametric tests. Nonparametric tests. Computing consistent ranks. Comparison of two samples by the mean and comparison of variances of two samples using nonparametric tests. Data consistency assessment.
5	ANOVA	Comparison of averages in more than two objects. Analysis of variance. Nonparametric ANOVA
6	Correlation-regression analysis	Statistical connection and methods of its study. Correlation coefficient: graphical assessment, Pearson, Spearman, Kendall coefficients. Linear regression analysis. Pairwise linear regression. Multiple Linear Regression. Non-linear regression models. Correlation ratio
7	Time series analysis	Dynamic (time) series, their classification, structure, tasks and conditions of study.

		Indicators of the analysis of the series of dynamics. Time series trend analysis. Making forecasts. Revealing seasonal irregularities in time series
8	GIS in nature magement	Main direction of application of GIS in ecology and nature management. Applied problems.

The program is compiled in accordance with the requirements of the educational standard of higher education of the RUDN

DEVELOPER:

Docent of the ESandPQM
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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>Landscape planning / Ландшафтное планирование /</i>
Course Workload		2 ECTS (72 ac.h.)
<i>Course modules and contents</i>		
№	Course modules	Contents
1.	Introduction. The concept of landscape planning	Goals and objectives of the discipline. Basic concepts. Landscape and other forms of territorial planning. A brief history of the development of landscape planning. Foreign and Russian experience..
2.	Principles of landscape planning and structure of landscape plans	Scientific and methodological principles of landscape planning. Regulatory and legal support of landscape planning. Normalization and standards of the state of the natural environment and permissible anthropogenic impacts. The structure of the landscape plan and the stages of its compilation. Principles of map construction.
3	The use of landscape planning in solving industry problems	General provisions. Land management Water resources management. Water protection zoning Urban planning design. Assessment of the impact of the projected objects on the environment.
4	Landscape planning of built-up areas	Socio-economic space and its structure. The theory of the central places of the Crystaller. Polarized landscape. Urban landscape. Forms of organization of urban space. The historical core of the city, the central zone, the outer zone and the suburban. Functional assessment of the city from the standpoint of man and his ecological functions. The city as a natural and technical system. Specially protected natural areas in the city. Planning of recreational areas. Landscape improvement of residential areas of the city.
5	Formation of the ecological framework of the territory: the most important principles and criteria	Definitions and classification of specially protected natural areas. Features of their development in Russia. Ecological framework in the landscape planning system: concept, structure, functions. Principles of planning an ecological framework. Ecological and economic assessment of the area in order to identify the main problems of nature management.
6	Landscape architecture and design	Characteristics of the main styles of landscape art. The history of their origin and features of development in Russia. The main elements of landscape architecture. Small architectural forms. Manor complexes of Russia as an example of the development of landscape architecture. Landscape design as

		the most promising large-scale direction of landscape planning.
7	Features, problems and tasks of landscape planning in Russia and abroad	Features of landscape planning in Russia. World experience in landscape planning. Actual problems of landscape planning. Prospects for its development in Russia and abroad.

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DEVELOPER:

Docent of the RNM Department

Aleinikova AM.

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Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>History and methodology of ecology and natural resources management</i>
Course Workload		6 ECTS (216 ac.h.)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Translation of scientific literature in the specialty. Scientific style of natural science disciplines in Russian and the studied foreign language	Interferences in scientific speech at the level of translation. Translation of scientific terms, units of measurement, formulas, graphs, proper names, geographical names, names of organizations. Ways to achieve adequacy and equivalence in the translation of scientific literature. Work with dictionaries and reference books. The use of computer technology in translation
2.	Annotating, summarizing and compiling reviews. Primary and secondary texts	Fundamentals of scientific text compression. Conventions and strategies for creating secondary texts of varying degrees of compression: abstracts, annotations, analytical reviews of foreign-language scientific literature in the specialty
3	Writing and presentation of scientific work in the specialty. Scientific text	Definition of scientific text. Types of scientific texts, their structure, paragraphing, division into paragraphs. Stratification of scientific literature vocabulary. Term classes. Features of functioning in scientific texts of categories of parts of speech of a foreign language in comparison with Russian. Features of punctuation. Means of communication of the text, expressing the sequence of thoughts, explanation, clarification or argumentation of thought; adversarial-restrictive relations; final value. Unions and compound turns and their corresponding unions in the Russian language. Syntax of scientific speech. Preparation of written works. Rules for citing, designing footnotes, rules for compiling a bibliography. Scientific message.

		Scientific article: principles of writing and presentation. Master's research work. Rules for construction, writing and presentation
4	Business communication.	Norms of etiquette of oral business communication. Situations of oral business communication: meetings, negotiations, reception of delegations, conversation with clients, telephone conversations. Etiquette in business correspondence. Phraseology in the language of written professional and business communication, speech patterns, clichés, politeness formulas. Types of business letters, documents. Business communication on the phone.

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DEVELOPER:

Head of the Department of
foreign languages

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HEAD OF THE DEPARTMENT:

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Управление природопользованием

Course title		<i>Management of the mineral resource complex / Управление минерально-сырьевым комплексом /</i>
Course Workload		2 ECTS (72 ac.h.)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Introduction to the industrial nature management	Concept of nature management. Evolution and features of the industrial nature management. Modern problems of nature management in the industrial sector of the economy. Mineral resource complex. Modern tendencies
2.	Sectoral problems of industrial nature management	Problems of industrial nature management in mining industry.
3	Environmental and economic consequences of sectoral problems of industrial nature management	Concept of the environmental damage. Approaches to the calculation of damages in different sectors of economy. Evaluation of natural environmental damage and its economic equivalents. Environmental damage calculation as a base for the evaluation of economic efficiency of nature protection
4	Best available technologies in the industrial nature management	Concept of BATs. Development of the system of regulation in the industrial nature management. Actual European experience and national features of BAT standardization
	Economic efficiency of environmental protection projects	Basics of economic assessment of the efficiency of environmental protection projects. Components of the environmental and economic efficiency and their calculation.

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DEVELOPER:

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Department



Redina M.M.

*Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
(RUDN University)*

Institute of Environmental Engineering

COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program


Управление природопользованием

Course title		<i>Methods of monitoring environmental safety of nature management/ Методы мониторинга экологической безопасности природопользования /</i>
Course Workload		4 ECTS (144 academic hours)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Introduction.	The impact of enterprises on the environment: classifications and indicator substances. The subject and object of industrial environmental monitoring (IEM). Main tasks.
2.	PEM in the structure of the environmental monitoring system.	ESSM, departmental environmental monitoring of IEM in the structure of the environmental monitoring system. ESSM, departmental environmental monitoring. Legislative and regulatory-technical base of the organization of IEM .
3	Instruments and systems for monitoring the atmosphere and air of the working area	Instruments and systems for monitoring the atmosphere and air of the working area. Regulatory support for monitoring. The main types of devices. Approaches to the organization of monitoring of the atmosphere in production conditions. GIS technologies and remote methods. Use of IEM data of the state of the atmosphere
4	Instruments and systems for monitoring the quality of water bodies.	Devices and systems for monitoring the quality of water bodies. Regulatory support for monitoring. Surface water monitoring system. Monitoring of groundwater. Geodynamic monitoring. GIS technologies and remote methods.
5	Soil quality monitoring devices and systems	Soil quality monitoring devices and systems. Regulatory support for monitoring. Methods of selection and indicators of soil and soil quality. GIS technologies and remote methods.

6	Devices and systems for monitoring the quality of biological resources	Devices and systems for monitoring the quality of biological resources. Regulatory support for monitoring. Monitoring of the state of biological objects. Bioindication. GIS technologies and remote methods.
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The program is compiled in accordance with the requirements of the educational standard of higher education of the RUDN

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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>Methodology of scientific creation</i>
Course Workload		2 ECTS (72 ac.h.)
<i>Course modules and contents</i>		
№	Course modules	Contents
1.	Concept of science	Concept of Science. 1.2. The big fields of the Science. 1.3. Divisions and branches of the sciences. 1.4 Basic Sciences. 1.5 Applied Sciences
2.	Development of the Science across the time	2.1. Historical - scientific frame. 2.2. The Genesis of the scientific thought. 2.3. Types prescientific of knowledge. 2.4. Rational speculation and origin of the natural science
3	The scientific method	3.1. Methods of the Science: analysis and synthesis, induction and deduction. 3.2. Characteristics and limitations of the scientific method. 3.3. Formal systems, models and interdisciplinary knowledge
4	Information	4.1. Quality & quantity features, 4.2. Classification of information. 4.3. Categories of articles in scientific journals. 4.4. Bradford's law. 4.5. Duplication of researches. 4.6. Subsequent steps of a literature search. 4.7. Key Words. 4.8. Relevant and pertinent documents. 4.9. Types of search with searching machines
5	Introduction to the research; Variables	5.1. Independent, dependent & confounding variables. 5.2. Choosing the Measurement. 5.3. Types of validity. 5.4. Reliability. 5.5. Sampling Groups to Study
6	Creating the Design of research	6.1. Qualitative versus Quantitative. 6.2. Empirical methods 6.3. Observation. 6.4. Experiment
7	The observation as a source of the science	7.1. The observation and the empirical science. 7.2. Features of scientific observation. 7.3. Intersubjectivity and objectivity. 7.4. Can an Observation Be Wrong? 7.5. Repeatability. 7.6. Types of observations. 7.7. Design a system for data collection. 7.8. Disadvantages of observation
8	Diffusion of reports and works of research	8.1. Scientific spreading (divulgarion) and specialized means. 8.2. Criteria of choice of the way of diffusion. 8.3. Scientific magazines. 8.4. Quality indicators. 8.5. Advance of a publication of research in poster
9	Experiments	Typical Designs and Features in Experimental Design.

		9.2. Central Tendency and Normal Distribution. 9.3. Calculating Experimental Errors. 9.4. Probability and Statistics. 9.5. Mean and Standard Deviation. 9.6. Reporting the Results of an Experimental Measurement. 9.5.Current contents and limitations
10	Research, development and scientific innovation	10.1. Concept. 10.2. Big inventions and inventors. 10.3. Development. 10.4. Innovation. 10.5. Patents. 10.6.Economic aspects
11	Social responsibility of the scientist	11.1. Responsibility in the application of the scientific method. 11.2. Scientific fraud. 11.3. The scientist likeconductive force of the progress of the knowledge
12	Studies of postdegree and centers of research	12.1. Project curricular. 12.2. Studies of degree. 12.3. Postdegree. 12.4. Doctorate. 12.5. National andInternational Centers of Research

The program is compiled in accordance with the requirements of the educational standard of higher education of the RUDN

DEVELOPER:

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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>Modern methods and technologies of environmental protection / Современные методы и технологии защиты окружающей среды /</i>
Course Workload		4 ECTS (144 ac.h.)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Environmental hazard of waste. The concept of ecosystem sustainability. Cycle of substances and elements	Features of interaction of xenobiotics with adiabatic components of the environment. Features of the impact of pollutants on living organisms. Environmental, physicochemical and toxicological features of priority persistent organic pollutants (POPs). The cycle and biogeochemical cycles: carbon, nitrogen, sulfur, phosphorus, metals.
2.	Self-cleaning ability of ecosystems. Parameters of ecosystem sustainability	The principles of the existence of ecosystems. Homeostasis. Types of resilience. The cycle of substances and elements. Self-cleaning ability of ecosystems. Abiotic self-purification processes. Biotic self-purification processes. Soil microbiocenosis. Microbiocenosis of water bodies. Microflora of the air. The degree and speed of self-cleaning. Assimilation capacity of the ecosystem.
3	Wastewater & Sewage Treatment. Sediments of Wastewater	The main sources of wastewater. Composition and Sources of Wastewater. Types of Wastewater Pollution (according to physic and chemical properties). Atmospheric Sewage or Runoff. Household Wastewater. Modern Methods of Sewage Treatment (according to the mechanism of action). Technological Treatment Schemes
4	Gas Emissions Treatment: Modern Approaches	Classification of gas emissions based on the aggregative state. Dispersion of systems (particle sizes). Particulate matter - aerosols: dust, fumes. Methods of the air protection. Methods for cleaning of gas & dust emissions from aerosols. "Wet" cleaning of gas and dust emissions from aerosols
5	Solid Waste Treatment Technologies: Secondary Raw Materials Recycling, Thermal Processing.	Pyramid of the waste management. Waste as the "secondary resources": recycling and "waste to energy" technologies. Norms for the assessment of the waste danger. Norms of the waste formation, accumulation, storage and processing
6	Landfilling	Sources of Industrial Solid Waste (ISW). Ecological

		Features of ISW. Methods of Industrial Nonradioactive Waste Elimination and Processing. Basic Methods of Municipal Waste Processing. Sorting and Using as Secondary Raw Materials. Rational MSW sorting scheme. "Dry" mechanical or Physical methods. The main technological indicators of the efficiency of separation of solid waste
7	Water bodies Remediation Technologies	Types of water bodies. Types of pollutants of water bodies. Sources of water pollution. Water restoration methods. Stages of environmental remediation of water bodies and preparatory works: technical, biological. Creation (restoration) of the coastal ecosystem. Comprehensive improvement of the surrounding area. Examples. Purification of water objects from oil products. Reducing the concentration of pollutants in water bodies

The program is compiled in accordance with the requirements of the educational standard of higher education of the RUDN

DEVELOPER:

Docent of the ESandPQM
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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>Modern problems of ecology</i>
Course Workload		3 ECTS (108 ac.h.)
<i>Course modules and contents</i>		
№	Course modules	Contents
1.	Introduction	Ecology as a complex science direction. Stages of the development of the ecological knowledge and science. System of the ecological disciplines. Ecology and nature management. Ecology and sustainability
2.	Concept of the nature (use) management	Main directions and types of nature management. Laws and rules in ecology. Modern ecological problems of nature management: environmental consequences of gaps in nature management.
3	Human ecology	Stages of human development as a biological species. Dependence on natural conditions and factors. Periods of the noosphere development
4	Crises in the history of mankind	Crises in the historical development: sources and consequences. Modern stage of the development: difficulties in the functioning of ecosystems. Demographic crisis. Social crisis. Energy crisis
5	Strategies for overcoming the environmental crisis	Sustainable development strategies and goals. Solving environmental and social problems. Solving the problems of resource availability. Modern ecological research.

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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program


Управление природопользованием

Course title		<i>Monitoring of natural and man-made systems/ Мониторинг природно-техногенных систем /</i>
Course Workload		4 ECTS (144 academic hours)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Introduction.	State of natural systems and their stability. Description models. Environmental norms and assessment of the stability of natural systems. Monitoring of the environmental quality on the base of environmental indicators.
2.	PEM in the structure of the environmental monitoring system.	ESSM, departmental environmental monitoring of IEM in the structure of the environmental monitoring system. ESSM, departmental environmental monitoring. Legislative and regulatory-technical base of the organization of IEM .
3	Instruments and systems for monitoring the atmosphere and air of the working area	Instruments and systems for monitoring the atmosphere and air of the working area. Regulatory support for monitoring. The main types of devices. Approaches to the organization of monitoring of the atmosphere in production conditions. GIS technologies and remote methods. Use of IEM data of the state of the atmosphere
4	Instruments and systems for monitoring the quality of water bodies.	Devices and systems for monitoring the quality of water bodies. Regulatory support for monitoring. Surface water monitoring system. Monitoring of groundwater. Geodynamic monitoring. GIS technologies and remote methods.
5	Soil quality monitoring devices and systems	Soil quality monitoring devices and systems. Regulatory support for monitoring. Methods of selection and indicators of soil and soil quality. GIS technologies and remote methods.

6	Devices and systems for monitoring the quality of biological resources	Devices and systems for monitoring the quality of biological resources. Regulatory support for monitoring. Monitoring of the state of biological objects. Bioindication. GIS technologies and remote methods.
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Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>Philosophical problems of nature sciences</i>
Course Workload		3 ECTS (108 ac.h.)
<i>Course modules and contents</i>		
№ п/п	Course modules	Contents
1.	Features of philosophical problems	The crisis of metaphysics. Philosophical problems of technology. Philosophical problems of modern science Philosophical problems of physics and cosmology
2.	Skepticism in modern philosophy	The problem of rationality The induction problem
3	Linguistic turn in philosophy	The problem of truth. The problem of consciousness. Communicative program by J. Habermas

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COURSE DESCRIPTION

Higher Education Field 05.04.06 Ecology and nature management

Higher education program

Управление природопользованием

Course title		<i>Radioecological safety of territories / Радиоэкологическая безопасность территорий /</i>
Course Workload		3 ECTS (108 ac.h.)
<i>Course modules and contents</i>		
№	Course modules	Contents
1.	Priority tasks in the field of radiation protection of the population	Priority tasks in the field of radiation protection of the population. Control of the content of natural radionuclides and radioactive contamination by technogenic radionuclides of objects of the natural environment, products and materials.
2.	Radiation safety standards	The radiation safety standards NRB 99/2010 as a fundamental regulatory document for certification of objects, products and materials on the basis of radiation
3	Regulatory documents regulating the content of technogenic radionuclides	Regulatory documents regulating the content of technogenic radionuclides (TRN) 137Cs and 90Sr in food products. Determination of the specific activity of radionuclides in food products using the alpha-, gamma-, beta-spectrometric complex "Progress". Preparation of counting samples. Device and software of the Progress spectrometric complex. Sampling of food products. Documents issued during the certification of food products on the basis of radiation. Monitoring of the content of radionuclides in drinking water.
4	Radiation control of materials	Regulatory documents regulating the content of technogenic radionuclides (TRN) 137Cs and 90Sr in wood raw materials and wood products. Sampling of wood raw materials. Sample preparation. Documentation. Radiation monitoring of scrap metal. Regulatory documents regulating the content of natural radionuclides (EN) 226Ra, 232Th and 40K in building materials. Determination of the specific activity of radionuclides using the Progress spectrometric complex. Sampling of building materials. Sample preparation. Documents issued during the certification of building materials on the basis of radiation
5	Conducting radiation-hygienic examination of residential and public buildings	Regulations governing the conduct of radiation-hygienic examination of residential and public buildings. The procedure for measuring the power of the equivalent radiation dose and the volumetric activity of radon isotopes in the air in

		residential and public buildings. Anti-tornado protection of residential and public buildings.
6	Permissible levels of ionizing radiation and radon in construction sites	Regulatory documents regulating the permissible levels of ionizing radiation and radon in construction sites. The procedure for carrying out work on measuring the power of the equivalent radiation dose on building sites. The procedure for sampling air and carrying out work on measuring the density of radon flux from the ground surface on building sites. Methods for measuring the radon flux density from the ground surface. Documents issued during the survey of building sites on the basis of radiation.

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