

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

COURSES' DESCRIPTION

The mastering of the courses is carried out as part of the implementation of the main professional syllabus (Higher Education programme, specialization)

«Climate Project Management»

(Profile/Specialization of Higher Education Professional Program)

implemented in the Higher Education Field:

05.04.06 Ecology and Nature Management

(Code and Name of Higher Education Field)

Disciplines (modules) are studied as part of the mastering of Higher Education Program «Climate Project Management» in frame of Higher Education Field 05.04.06 Ecology and Nature Management

Course title		<i>Foreign Language</i>
Course Workload, credits and academic hours		6/216
Course Content		
№ п/п	Course Modules	Brief Description of the Module Content
1.	Introductory Phonetic and Grammar Course	Topic 1.1. Pronunciation and spelling Topic 1.2. Introductory Listening and Speaking Course Topic 1.3. Plural formation of nouns. Expression of request
2.	A basic level	Topic 2.1. The gender of nouns. Possessive pronouns. Topic 2.2. Expression of time in a simple sentence) Topic 2.3. The concept of the Russian verb. Instrumental case of nouns. Topic 2.4 Instrumental case of nouns. Verb WANT Topic 2.5. A model for the formation of the past tense from verbs with constant stress based on Topic 2.6. Model of the formation of the past tense from verbs with variable stress. Topic 2.7. Constructions need + infinitive, you can + infinitive, What you need (can) + infinitive Topic 2.8. Compound future tense of verbs. Topic 2.9. The verb to learn in the present, past and future tenses. Topic 2.10. The verb is to speak in the present, past and future tenses. Imperative. Topic 2.11. The verb to teach is in the present, past and future tenses. Topic 2.12. Expression of the absence of the subject (it does not exist). Telephone etiquette. Topic 2.13. Constructions I have (was, will be) and I do not have (was not, will not be). Topic 2.14. I like the design. Comparison of typical contexts for the use of the verbs love and like. Topic 2.15. Prepositional case of place. Topic 2.16. The expression of time in a simple sentence. Prepositional verbs. Topic 2.17. Telephone etiquette. Formation of a simple comparative degree of adverbs Topic 2.18. Instrumental case in the meaning of action compatibility Topic 2.19. General idea of verbs of motion. Accusative case to indicate the direction of movement. Topic 2.20. Group verbs go and walk in the future and past tenses. Topic 2.21. Ordinals. Time structures. Topic 2.22. Genitive case to indicate direction (with the question from where?).

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	<p>Topic 2.23. Verbs of motion go, go, go, go, come, arrive, walk, drive.</p> <p>Topic 2.24. verb to return. Features of the conjugation of verbs with the particle -sya ..</p> <p>Topic 2.25. Telephone etiquette. The formation and use of forms of the imperative mood with the word let.</p>
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Course title	<i>IT in ecology and natural resources management</i>
Course Workload, credit units /academic hours	4 /144
Brief Course Content	
Course Modules	Course Modules and Contents:
1. Application of computer technologies in the Practical work of an Ecologist	1.1. Internet resources containing legal and statistical information. Scientific citation databases and scientific social networks
	1.2.Specialized programs for complex calculations on environmental impact assessment, risk analysis. Software tools for processing text and graphic images
	1.3.Application of standard office suite computer programs for solving standard and non-standard practical tasks, performing economic and environmental calculations
2. Statistical data processing using computer programs	2.1. Primary processing of statistical data
	2.2.Estimation of characteristics of the general population
	2.3.Testing statistical hypotheses
	2.4.Variance analysis
3. Analysis of experimental data and forecasting	3.1.Correlation and regression analysis
	3.2.Analysis of dynamic series and forecasting

Course title	<i>Methodology of Scientific Creation</i>
Course Workload, credit units /academic hours	4/144
Brief Course Content	
Course Modules	Course Modules and Contents
Scientific research methods, their development in ecology	Basic terms and definitions, structure of research activities, relevance and scientific novelty, classification of scientific research methods, tools for identifying problems, methods aimed at enhancing the use of experience and intuition of specialists, logical laws.
Introduction to Information Retrieval Theory	Information, types of information, ascending/descending information flows, the birth of information, the law of information dispersion.
	Search for information, search for information in the Internet, use of libraries and databases.
Empirical methods of knowledge	Methods of empirical knowledge, observation
	Measurements, measurement scales, measurement errors

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	The concept of an experiment, experiment planning, processing of experimental results
	Surveys, interviews, expert surveys
Methods and approaches to the analysis of the obtained data	Statistical and mathematical methods in ecology. Reliability and validity of the obtained data. Experiment, approaches to analysis. Collection and analysis of databases.
Presentation of scientific data	General requirements for research work, the basics of scientific citation, the effectiveness of scientific research
	the concept of plagiarism in scientific activity
	discoveries, their mechanism and typology.
Final qualifying works	Thesis planning. Responsibilities of the head of the thesis. Structure and design of the thesis.
	Approaches to presenting thesis data
	Presentation of the work.
Research Article	Types of scientific articles. Types and ratings of journals.
	Citation index.
	Article writing approaches
Conferences, symposiums, etc.	Types of scientific events. Purposes of participation in conferences, etc. Presentation of materials. Scientific discussion and its importance in promoting research, conducting scientific discussion.
Research, Development and Scientific Innovation. Social responsibility of the scientist.	Patents Economic aspects of research. Informational efficiency of the research. Responsibility in the application of the scientific method. Scientific ethics
Financial support for research	Grants. Funds. Paid scientific activity within the framework of contracts. Grant application, execution and planning.
Ethical aspects of scientific research in ecology	Ethical code of the ecologist. Rules of biological ethics in scientific research.

Course title	<i>International cooperation in the field of nature protection</i>
Course Workload, credit units /academic hours	4/144
Brief Course Content	
Course Modules	Course Modules and Contents
Modern global environmental problems and the implementation of the principles of sustainable environmental and economic development	Modern global environmental problems. Natural-political nature of interstate conflicts in the field of environmental management. The need for international regulation.
	International financial organizations in addressing environmental protection issues (World Development Bank, European Development Bank, etc.)

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	International environmental organizations
International conferences as a tool for solving international environmental problem	The role of an international treaty and its features in the regulation of interstate relations in the field of environmental protection. International agreements
	The contribution of international conferences to the development of international environmental law (retrospective analysis). Basic international legal documents
	Contents of the most important regional agreements
	General concepts of international environmental law
Legal mechanisms of international legal regulation	International legal regulation of marine environment protection; protection of atmospheric air, near-Earth space and climate
	International legal protection of biological diversity in general, flora and fauna.
	Responsibility of states for environmental pollution

Course Title	<i>Carbon Credits Markets</i>
Course Workload , credits and academic hours	4/144
Course Content	
Course Module Title	Brief Description of the Module Content
Module 1. Global Trends in Carbon Markets Development	Topic 1.1. Concept framework for Carbon Markets Development. From Kyoto Protocol to Article 6 of the Paris Agreement. EU Emissions Trading Scheme
	Topic 1.2. Mandatory carbon markets. National and regional markets. Voluntary carbon markets. Local governments and carbon markets
Module 2. International Carbon Credits Standards	Topic 2.1. Clean Development Mechanisms Standards
	Topic 2.2. Climate, Community and Biodiversity (CCB) Standard. Carbon Verified Standard.
	Topic 2.3. Golden Standard
Module 3. Life Cycle of Carbon Projects	Topic 3.1. Project Concept & Financing
	Topic 3.2. Project Development and Monitoring: Implementation and Monitoring. Project Registration. Project Validation
	Topic 3.3. Credits Issuance & Sales: Credit Verification.

Course Title	<i>Carbon Cycles</i>
Course Workload , credits and academic hours	4/144
Course Content	
Course Module Title	Brief Description of the Module Content
Module 1 Introduction to Carbon Cycles	Topic 1.1 Fundamentals of the carbon cycle
	Topic 1.2 The relationship between the components of the carbon cycle

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Module 2 The impact of climate change on carbon cycles	Topic 2.1 The impact of climate change on the carbon cycle
	Topic 2.2 The impact of anthropogenic factors on the carbon cycle
Module 3 Carbon cycle management	Topic 3.1 Methods of monitoring and analysis of carbon fluxes.
	Topic 3.2 Carbon cycle management strategies to reduce emissions.
Module 4 Application of knowledge about carbon cycles in climate project management	Topic 4.1 Assessment and forecasting of the consequences of changes in the carbon cycle.
	Topic 4.2 Development and implementation of measures to adapt to changes in the carbon

Course Title	<i>International Standards for GHG Management</i>
Course Workload , credits and academic hours	4/144
Course Content	
Course Module Title	Brief Description of the Module Content
Introduction	International practice of GHG modelling, accounting and management. Environmental standards and norms and carbon regulation. IPCC recommendations. GHG quantification methodologies and their hierarchy
GHG reporting	ISO 14064-1:2018 as a base for GHG accounting and reporting. National specificities of implementation
Projects on GHG management	ISO 14064-2:2019, GHG-projects and their validation
GHG validation and verification activities	ISO-14064-3:2018, ISO 14065:2020, ISO 14066:2011 and organization of validation and verification activities. GHG validation and verification bodies. International practice. Implementation in Russia.
Carbon footprint and its assessment	LCA models according to ISO 14040. Carbon footprint assessment on the base of ISO 14067:2018. Main principles, requirements, methodologies
GHG management in the industrial sectors	ISO/TR 14069:2013 Greenhouse gases. Quantification and reporting of greenhouse gas emissions for organizations. Guidance for the application of ISO 14064-1 ISO 14080:2018 Greenhouse gas management and related activities. Framework and principles for methodologies on climate actions ISO 14083:2023 Greenhouse gases. Quantification and reporting of greenhouse gas emissions arising from transport chain operations ISO 14097:2021 Greenhouse gas management and related activities. Framework including principles and requirements for assessing and reporting investments and financing activities related to climate change.

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	<p>ISO 14068-1:2023 Climate change management. Transition to net zero. Part 1: Carbon neutrality ISO 6338-1:2024. Calculations of greenhouse gas (GHG) emissions throughout the liquefied natural gas (LNG) chain. Part 1: General ISO 14385-1:2014 Stationary source emissions. Greenhouse gases. Part 1: Calibration of automated measuring systems and ISO 14385-2:2014 Stationary source emissions. Greenhouse gases. Part 2: Ongoing quality control of automated measuring systems</p>
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Course Title	Environmental Engineering and Climate Change
Course Workload , credits and academic hours	4/144
Course Content	
Course Module Title	Brief Description of the Module Content
1. Sustainability and circular economy	Basic principles of the circular economy. Circular economy model. Infrastructure of the circular economy. Theoretical foundations of the circular economy. Formation of the subject area, concept and features. The concept of "cradle to cradle". The model of the circular economy and the stages of its formation. Indicators of sustainable development in the field of waste management. Basic principles of the circular economy in the field of waste management.
2. Climate-neutral resource management	Contribution of the waste management sector to the Earth's climate. Water resources and climate change. Adaptation and mitigation strategies.
3. Cleaner production	Drinking Water treatment. Water properties, water treatment stages.
4. Green technologies in wastewater treatment	Basic characteristics of wastewater. Oil and grease. Other important wastewater characteristics. Aerobic, anoxic, anaerobic biological treatment. Aerobic biological treatment. Anoxic biological treatment. Anaerobic biological treatment. Microorganisms in wastewater. Biological cells. Ecology of biological wastewater treatment. Reaction kinetics.

Course Title	<i>Climate Project Development</i>
Course Workload , credits and academic hours	4/144
Course Content	
Course Module Title	Brief Description of the Module Content
Module 1 Introduction to climate projects	Topic 1.1 The concept of climate projects
	Topic 1.2 Goals and objectives of climate projects
	Topic 1.3 Main stages of development and implementation of climate projects
	Topic 2.1 Identification of climate risks

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Module 2 Analysis and assessment of climate risks	Topic 2.2 Methods of assessing climate risks
	Topic 2.3 Analysis of the sensitivity of the project to climate change
Module 3 Development of adaptation strategies and mitigation of climate impacts	Topic 3.1 Strategies for adaptation to climate change
	Topic 3.2 Reducing climate impacts
	Topic 3.3 Choosing optimal solutions to minimize climate risks
Module 4 Climate project management	Topic 4.1 Planning and organization of climate projects
	Topic 4.2 Monitoring and control of the implementation of climate projects
	Topic 4.3 Assessment of the effectiveness and results of climate projects

Course Title	<i>Carbon Test Areas and GHG Monitoring</i>
Course Workload , credits and academic hours	4/144
Course Content	
Course Module Title	Brief Description of the Module Content
Introduction	The role of the carbon test areas in GHG research and mitigation strategy
Data for the GHG fluxes modelling	Information basics for the GHG fluxes modelling: content, requirements, limitations for collection, processing and storage
Carbon fluxes in terrestrial ecosystems	Specificity of models and data collection. Instrumental support and monitoring methodologies
Sea carbon test areas	Specificity of models and data collection. Instrumental support and monitoring methodologies
Instruments for the carbon test areas	Observation methodologies and equipment for the carbon test areas, optimal methodologies and instruments

Course Title	<i>Climate Neutrality and Waste Management</i>
Course Workload , credits and academic hours	3/108
Course Content	
Course Module Title	Brief Description of the Module Content
Module 1. INTRODUCTION: WASTE MANAGEMENT ISSUES AND SOLUTIONS	Topic 1.1. Sources of waste generation and impact on the environment and climate change. Modern approaches to waste management. Waste in circular economy. Concepts and basic principles of resource saving. Products from Waste: Problems and Solutions. Waste processing industry. Secondary raw materials. Technology for the production of secondary raw materials.
	Topic 1.2. Technologies for municipal solid waste processing. General characteristics of technologies. The main types of waste, their brief description, principles of classification and subsequent processing. Basic concepts of waste management.

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	Warehousing and landfilling of MSW. Greenhouse gases formation processes: stages and products.
Module 2. NON-ORGANIC WASTE: PROCESSING.	Topic 2.1. Mechanical processing of solid waste. Methods for the preparation and processing of solid waste. Classification of materials and equipment for its implementation. Goals of waste processing. Waste shredding: crushing and grinding, milling. Crushing stages, basic regularities. Large medium and fine crushing. Compacting and pressing.
	Topic 2.2 Separation technics and equipment. Principles of classification. Hydraulic and air classification and equipment for implementation. Aeroseparation. Vibroseparation.. Hydroseparation. Dosing of bulk materials. Feeders. Dosers. Mixing solids. Screening. Types of screens, grids and sieves
Module 3. ORGANIC WASTE: PROCESSING	Topic 3.1. Thermal processing of waste. Obtaining granulated fuel (RDF). Fire method of waste processing. Incineration of solid combustible waste. Classification of combustion methods. Equipment for fire neutralization and waste processing. Waste pyrolysis. Waste gasification.
	Topic 3.2 Microbiological decomposition of bioorganic waste. Composting (stages, technics and equipment, parameters, products). Methane digestion (stages, conditions, products).
	Topic 3.3. Sewage sludge. Formation of sewage sludge. Characteristics of sediments (humidity, density, fluidity and contamination. Sludge Treatment Processes: Compaction, Stabilization, Conditioning, Dewatering, Decontamination and Neutralization.

Course Title	<i>Climate Change Models</i>
Course Workload, credits and academic hours	3/108
Course Content	
Course Module Title	Brief Description of the Module Content
Introduction	Climate of the Earth: history, reconstructions, theories
Assessment of the role of greenhouse gases in the climate change	Greenhouse gases, their main properties and contribution to the global warming
A human impact on climate	Homan activity and assessments of GHG emissions. The most important greenhouse gas flows. Emissions and removals
Climate risk and mitigation strategies	Climate risk and mitigation strategies: basic concepts; manifestations of risk, indicators, efficiency of mitigation strategies

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Course Title	Remote Sensing Technics for Climate Change Assesment
Course Workload , credits and academic hours	5/180
Course Content	
Course Module Title	Brief Description of the Module Content
Introduction	Physical basics for Earth Remote Sensing, the study of types and means for remote sensing.
	Remote sensing data processing software: a variety of GIS.
	QuantumGIS interface, loading raster data, vector layers creation.
	Satellite images – types of satellites and missions, Open sources for images.
Basic principles of remote sensing, classification of remote sensing methods	Photointerpretation. photointerpretation signs. Features of recognition of artificial and natural objects.
	Semi-automatic classification of natural and anthropogenic objects.
RSE methods to solve Climate assessment tasks	Spatial analysis of GIS, a method for analyzing hierarchies. Cluster analysis, Geocomarketing.
	Vegetation indices, groups of vegetation indices. Landscape indices.
	Landfills. The main deciphering signs of unauthorized dumps. Methods for determining unauthorized dumps.
	Web GIS, Google Earth Engine.

Course Title	Geoinformatics for Enterprise Carbon Neutrality
Course Workload , credits and academic hours	5/180
Course Content	
Course Module Title	Brief Description of the Module Content
Introduction	Geoinformatics as a science. What is GIS. Classification of GIS.
	QuantumGIS interface, loading raster data, vector layers creation
	Raster operations. Vector operations.
	OpenStreetMap, satellite images, georeferencing
Basic principles of photointerpretation	Photointerpretation. photointerpretation signs. Features of recognition of artificial and natural objects
Spectral indices	Data analysis with QGIS: variety of indices, their significance and practical application, NDVI calculation, Introduction to the QGIS raster calculator
	Landscape indices. Building index
Enterprise Carbon Neutrality analysis methods	Vector analysis tools: random points layer creation, buffer zones.
	Vector analysis tools: spatial analysis, overlaying operations,
	Raster analysis tools: interpolations. Classifications, complex methods.

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	Cases: typical projects
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Course Title	Low-carbon Economy
Course Workload, credits and academic hours	4/144
Course Content	
Course Module Title	Brief Description of the Module Content
Introduction	Basics of low carbon economy, main principles and definitions. net-negative carbon economy
	Net zero, Carbon pricing for net-negative emissions
Sustainable development	SD goals and indices
	Sd scenarios
Renewable energy sources	Helioenergy
	Wind, Geothermal, Hydro energy
	Biofuel
Absolute and relative indicators,	Absolute indicators focused on CO2 emissions costs
	Relative indicators based on RES
	Real GDP growth based on night-time light data
	Low-carbon economies based on neo and reo
Ecosystem services	Ecosystem services: definition, history and importance
	Identification, quantification, and valuation
	Role in policy and management
Decarbonization technologies	Carbon neutral hydrocarbons
	Carbon capture and storage Combined heat and power
	Decarbonization activities by sector
	Actions taken by countries
	Low-carbon development strategy for the Russian economy Risks of transition to a low-carbon economy

Course Title	Ecosystem Services for Climate Change Mitigation
Course Workload, credits and academic hours	4/144
Course Content	
Course Module Title	Brief Description of the Module Content
Introduction	Basics of low carbon economy, main principles and definitions. net-negative carbon economy
	Net zero, Carbon pricing for net-negative emissions
Sustainable development	SD goals and indices
	Sd scenarios
Ecosystem services	Ecosystem services: definition, history and importance
	Identification, quantification, and valuation
	Role in policy and management
Economics and ecosystem services	Economic approaches to ecosystem assessment. Total economic value of the ecosystem
	Economic benefits of ecosystem services. Economic effectiveness of conservation ecosystem services

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	Payments for ecosystem services
Ecosystem services assessment	Ecosystem services of terrestrial ecosystems
	Ecosystem services of water ecosystems
	Ecosystem services in Russian legislation

HEAD OF THE HIGHER EDUCATION PROGRAM:

Director of the
Department of Environmental
Safety and Product Quality
Management

Savenkova E.V.

Position

Signature

Full name