Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA (RUDN University)
named after Patrice Lumumba

COURSES' DESCRIPTION

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

«Environmental Engineering in Construction»
(Network program with the National Research Moscow State University of Civil Engineering (NRU MGSU)

(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)

2024

Course Title	***Project management /*** ***Управление проектами***
Course Workload	**3 Credit (108 ac. h.)**
Course contents	
Course Module Title	**Brief Description of the Module Content:**
Topic 1. Project activity. **Models and schemes of project management.** **Management objects and project participants**	Goals and objectives to be solved in the project management process. Concepts of project and operational activities. Functional management, project management and variants of project management schemes. Basic concepts in project management. Basic organizational forms and classification of project types. Project participants and their functions. Functional, design and matrix management structures. Phases of the investment project. Phases of the project life cycle. International experience in project management. Project content management
Topic 2. Project development	Project life cycle, phases, schedule. The schedule of the impact on the project of the cost of change, risks and uncertainties. Project concept and investment plan. Pre-investment research. Project analysis. Financial feasibility of the project and its analysis. Feasibility study: purpose, composition and execution procedure. Business plan: appointment, participants, composition. Project initiation scheme
Topic 3. Project finance	Definition of finance, financial and monetary relations. Enterprise finance. Project financing and its sources. Organizational forms of financing. Project financing, its advantages and disadvantages

Topic 4. Evaluation of the effectiveness of investment projects	The effect and effectiveness of the project. The concept of discounting. The simplest methods for determining effectiveness. Methodological recommendations of the State Committee for Science and Technology. Methodology for determining the effectiveness of UNIDO. The equivalent annuity method.
Topic 5. Project planning	Definition and main tasks of planning. Processes and management levels: main and auxiliary processes. Hierarchical structure of WBS (Work Breakdown Structure). Milestones of the project. Network planning, Gantt chart. Network diagrams: arrow networks ADM arrow networks (arrow diagram method) and PDM precedence networks (precedence diagram method). Resource planning, reproducible and non-reproducible resources, functions of need and availability of resources. Calendar planning. Estimated planning.
Topic 6. Cost management and project regulation	Basic principles and methods of project cost management. Assets=liabilities. The balance sheet. Cost management throughout the life cycle of the LCC (life-cycle costing) project. Project cost estimation. Budgeting, its functions and models. Cost reporting. Monitoring of project activities and change management.
Topic 7. Work management	Basic concepts. The relationship of volumes, productivity and cost of work. An example of using linear programming for work planning. Managing the content of the works. Structure and scope of work. Effective time management. Labor productivity.
Topic 8. Quality Management	The concept of quality management: definition, sources of quality, the "house" of quality and the modern concept of quality management. Principles of General quality Management TQM (Total Quality Management). The concept of qualimetry. Project quality management. The Taguchi method. Quality management standards and ensuring the functioning of the quality management system. Certification of the project's products.
Topic 9. Project resource management	Project resource management processes. Material and technical support of the project. Processes and basic principles of project resource management. Procurement management. Supply management. Inventory

	management. Inventory accounting. Logistics in resource management.
Topic 10. Project Team	Human resource management planning. Data flows during management planning. The RACI matrix. What is a team. The effectiveness of the team. Project team recruitment. The main stages of the project team life cycle. Team development and organization of its work. Project team management and management types. Conflict management.
Topic 11. Risk management in projects	Basic concepts of risk management in projects. Qualitative and quantitative analysis of project risks. Methods of risk reduction. Organization of risk management.
Topic 12. Monitoring and completion of the project	Monitoring of project activities. Measuring progress and analyzing results. Decision-making and change management. Commissioning. Closing the project. Exit from the project.

Course Title	**Environmental control and monitoring of urban environment / Экологический контроль и мониторинг городской среды**
Course Workload	**2 Credit (72 ac. h.)**
Course contents	
Course Module Title	**Brief Description of the Module Content:**
Topic 1. Theoretical and methodological foundations of industrial waste management. Monitoring programs in the city.	*Human influence on changes in the circulation of substances and energy flows in the environment. Natural resource potential of production. Agro-climatic resources. Biological resources. The current state and features of use. Resource cycles; their classification and features of functioning. The nature of the production cycle of raw materials. Biogeochemical cycles. The volume of production of polluting products and their distribution in the environment, their stability and their ability to decompose. Transformation of harmful substances. Environmental passport of an industrial enterprise. GOST standard17.0.0.04-90 «Nature protection. Industrial enterprise ecological centrificate. Fundamental regulations». Assessment of environmental friendliness of production, consumption of raw materials, energy, natural resources. Emissions of pollutant sperunit of production.*
Topic 2. Study of the system of methods of observation and ground support of environmental monitoring	*Classification of environmental monitoring. Contact and non-contact control methods.*

Topic 3. Basic requirements for waste management activities	*Organization and implementation of state control and supervision of activities in the field of waste management. Environmental requirements for the placement of landfills for the storage of agricultural waste. Coordination with the general development plan of the suburban area. The prospects for the placement of polygons. The size of the sanitary protection zone. Normalization of anthropogenic load on landscapes and regulation of the structure of land acquisition. Conducting engineering and environmental surveys of the territory. Assessment of the possibility of using the territory. Environmental factors of the location of production facilities and enterprises.* *The Law of the Russian Federation "On Standardization". The scheme of operation of the landfill: organization, delivery, installation of cavaliers, excavation development, environmental control, unloading, sealing, laying of intermediate layers of insulation, closure and reclamation, environmental monitoring. Module "Technological processes and types of production in industry". Calculation of specific indicators of normative volumes of agricultural waste generation*
Topic 4. Mathematical modeling of dynamic processes in the field of waste management	*Simulation models in the field of waste disposal.*

Course Title	**Territorialplanningofcitiesandenvironmentalmanagement / Территориальное планирование городов и управление природопользованием**
Course Workload	**4 Credit (144ac. h.)**
Course contents	
Course Module Title	**Brief Description of the Module Content:**
Topic 1. Basic concepts in the territorial planning of urban areas. Organization of the projected territories.	Goals and objectives of the discipline. Basic concepts and objectives of territorial planning. Landscape and other forms of territorial planning. The main stages of design and urban planning documentation. Group systems of localities, functional zoning of the territory of a locality and stages of development of new territories. Principles of improvement of the relief of the projected territories.
Topic 2. Geodesy and its role in territorial planning. Principles and methods of landscaping the terrain of the territory	Basic concepts in geodesy, its goals, objectives and role in landscape and territorial planning.The main forms of terrain. Properties of horizontals and solving problems on a topographic map. Vertical layout of the territory (the method of profiles and the method of design horizontals).Cartogram of earthworks. Design of the road network. Elements of terrain improvement.
Topic 3. Earthworks and methods of their production	Classification of earthworks in urban conditions. Earthworks. Methods of production of earthworks. Production of earthworks by bulldozers. Production of earthworks by scrapers. Production of earthworks with single-bucket excavators.
Topic 4. Purpose and placement of urban engineering networks	Engineering networks and equipment of buildings and territories of settlements. Classification of underground utility networks by type. Types of engineering networks for their intended purpose. Principles of placement of engineering networks and collectors. Water supply systems and schemes. Regime and norms of water consumption. Wastewater and its classification, sewerage systems and schemes. Norms and modes of water disposal, determination

	of estimated costs. Systems and schemes of heat supply, tracing of heating networks. Gas supply: brief information about combustible gases, gas supply systems of settlements. Power supply systems and categories.
Topic 5. Engineering preparation of territories requiring special measures for their development	Principles of development of territories requiring special measures, engineering arrangement of urban areas. Coastal territories. Ravines and their classification. Reclamation of urban areas. Principles of development of territories with mudslides and landslides. Principles of development of territories of karst formations. Accounting for seismic phenomena.
Topic 6. Typology of land plots. Types of permitted use of land plots	General concepts and division of plots. Permitted use of land plots. Land categories. Classification of lands. Classifier of types of permitted use of land plots
Course project	Approximate topics: - earthworks at the foundation pit; - geodetic support of construction works; - energy efficiency of capital construction facilities; - requirements for soils during reclamation of territories; - entrance control of building materials (including environmental); - justification of the needs of the construction site for engineering resources (water supply, sanitation, electricity); - construction of highways in permafrost conditions; - recultivation of the developed quarry; - construction of a pit in cramped conditions; - other topics corresponding to the course being studied.

Course Title	**Urban development and engineering and environmental surveys / Развитие городов и инженерно-экологические изыскания**
Course Workload	3 credits (108 academic hours)
Course contents	
Course Module Title	**Brief Description of the Module Content**
Module 1. Regulatory and technical documentation for engineering and environmental surveys and urban agglomeration development	Regulatory, logistical and informational support of engineering and environmental surveys and environmental impact assessment. Provisions of the Town-Planning Code of the Russian Federation. Requirements and provisions of the code of Rules. Engineering surveys for construction. Types of engineering surveys, general requirements and rules for their implementation.
Module 2. Types of research, obtaining, systematization and processing of primary environmental and geoecological information.	Methods and methods of collecting and processing information of theoretical and empirical levels obtained on the basis of work with stock materials and documents, the results of field and laboratory studies, and data on the state of components of the natural environment, the presence of territories with special use regimes, cultural heritage sites, possible sources of pollution of atmospheric air, soils, soils, surface and groundwater, bottom sediments and surface water bodies, socio-economic conditions. Decoding of aerospace materials using various types of surveys (black-and-white, multi-zone, radar, thermal, etc.). Reconnaissance survey. Route observations describing the components of the natural environment and landscapes in general, the state of terrestrial and aquatic ecosystems, possible sources and visual signs of pollution. Research and assessment of pollution of atmospheric air, soils and soils, surface and groundwater. Research and assessment of bottom sediment pollution in surface water bodies. Research and assessment of the radiation situation. Research and evaluation of physical impacts. Sanitary and epidemiological studies. Gas-geochemical studies of soils. Studies of socio-economic conditions. Ecological and

	landscape studies. Study of vegetation. The study of the animal world. The study of dangerous natural and natural-anthropogenic processes of an ecological nature. Ecological testing of individual components of the environment (atmospheric air, soils, soils, surface and groundwater, bottom sediments). Laboratory chemical and analytical studies of samples of atmospheric air, soils, soils, underground and surface waters, bottom sediments. Desk processing of materials. Preparation of a technical report.
Module 3. Types of work: stages and content of engineering and environmental surveys, taking into account the trajectory and route of development of the city.	Planning, organizing and conducting engineering and environmental surveys and environmental impact assessment. Pre-investment, urban planning and investment levels and types of work on them carried out during engineering and environmental surveys.
Module 4. Engineering and environmental surveys on the main industrial objects of the city.	Engineering and environmental surveys and environmental impact assessment to substantiate project documentation by industry. Preparation and protection of the report.

Course Title	**Environmental rationing / Экологическое нормирование**
Course Workload	6 Credit (216 ac.h.)
Course contents	
Course Module Title	**Brief Description of the Module Content**
1. Environmental standards and norms in the system of nature management	Environmental norms and standards as nature management tools. The role of environmental regulation in ensuring the sustainable development of ecological and economic systems. The combination of environmental management tools and the effectiveness of their use.
2. Theoretic basics of environmental standards and norms	Concepts of sustainability. Types of stability of natural systems. Factors affecting the body, reactions of organisms and ecosystems to impacts
3. International cooperation in the field of environmental regulation	Environmental obligations of Russia. Harmonization of standards. The main directions of development of the domestic system of environmental regulation.
4. Harmonization of environmental regulations in the field of impacts on the atmosphere	The domestic system of rationing in the field of assessing the quality and use of atmospheric resources: basic principles and approaches. Current documents and prospects for modernization.
5. Harmonization of environmental regulations in the field of impacts on surface waters	The domestic system of rationing in the field of assessing the quality and use of resources of the surface hydrosphere: basic principles and approaches. Current documents and prospects for modernization.
6. Harmonization of environmental regulations in the field of impacts on groundwater	Domestic rationing system in the field of assessing the quality and use of underground hydrosphere resources: basic principles and approaches. Current documents and prospects for modernization.

7. Harmonization of environmental standards in the field of impacts on soil and land resources	The domestic system of rationing in the field of assessing the quality and use of soil and land resources: basic principles and approaches. Current documents and prospects for modernization. Global trends
8. Harmonization of environmental regulations in the field of waste management	Harmonization projects (including specific waste categories). Domestic rationing system in the field of assessing the quality and use of underground hydrosphere resources: basic principles and approaches. Current documents and prospects for modernization. Specifics of waste rationing in construction.
9. Concept of the best available technologies	The concept of BAT. The register of the best technologies. Prospects for the application of rationing based on the best existing technologies in Russia. But in building and construction
10. Norms and regulations for management of specific pollutants	POPS, hydrocarbons, heavy metals. Domestic and foreign approaches to the regulation. Prospects for the modernization of domestic standards. Specific pollutants in construction.
11. Environmental regulation and economics	Environmental regulations and standards as a basis for the development of economic methods of nature management regulation.
12. Environmental regulation and environmental design. Green standards	Environmental rationing and environmental design. Consideration of environmental regulations and standards in projects. Green standards.

Course Title	**Regional geoecology and urban geoecology**
Course Workload	3 credits (108 academic hours)
Course contents	

Title of sections (topics) of the discipline	**Summary of sections (topics) of the discipline:**
1. Introduction and general provisions of geo-ecological assessment	The subject and field of study of regional geoecology. Regional conditions. An integrated approach in the assessment of geo-ecological conditions.
2. Geo-ecological conditions of territories and factors of their formation.	Climatic, soil and vegetation, orohydrographic, geological factors. Their role in the formation of geo-ecological conditions.
3. Lithogenetic bases of regional ecology.	Engineering-geological approach as the basis of the regional geo-ecological assessment of the territory. Engineering and geological features of the territory of Russia. Characteristics of the shields of ancient and young platforms. Plates of ancient and young platforms. Folded regions and areas of alpine orogenesis. Shelf and seashore areas. Changes of the geological environment of various territories and its stability to the technogenic influence.
4. Geo-ecological zoning of territories.	The basic principles of typification of conditions. Identification of regions of different order, areas and districts. Geo-ecological maps.
5. Urban geo-geoecology as part of regional geo-ecology.	Foundations of urban structures. Methods of changing the properties of soil bases. Hydrogeology and hydrology of cities. Problems of water supply and sewage in cities. Underground excavations in cities. Urban soils. Construction and operation of the subway in various conditions. Geological processes and phenomena in cities. Monitoring of the natural urban environment. Recreational areas.

Course Title	**Territorial planning of cities and environmental management / Региональные и муниципальные системы управления отходами**
Course Workload	**3 Credit (108 ac. h.)**
Course contents	
Course Module Title	**Brief Description of the Module Content:**
Topic 1. WORLD EXPERIENCE IN THE WASTE MANAGEMENT. POSSIBLE SCENARIOS	Indicators of sustainable development in the field of waste management. Basic principles of waste management. World trends in the field of waste management. Experience of developed countries The main methods of integrated waste processing in the world.
Topic 2. WASTE AS A SOURCE OF SECONDARY RESOURCES AND ENERGY	Goals and objectives of regional waste management programs, indicators of program implementation used, results of implementation. Short and long term programs. Regional features to be taken into account when developing programs. Waste composition. Analysis of the resource and energy potential of waste
Topic 3. MECHANISMS FOR WASTE MANAGEMENT IMPROVING (CASE OF STUDY - RUSSIAN FEDERATION).	Improving the regulatory framework in the field of waste management. Environmental collection and extended liability of producers and importers of goods. Waste disposal fee.
Topic 4. INSTITUTE OF EXTENDED PRODUCER RESPONSIBILITY, ENVIRONMENTAL FEE	Hierarchy levels in the field of waste management. Minimization of waste generation - resource saving and low-waste technologies. Classification of municipal solid waste and organization of a separate collection system.
Topic 5. REGIONAL & MUNICIPAL	Territorial waste management schemes.

WASTE MANAGEMENT SCHEMES.	Regional Operator Institute. Determination of waste streams generated in various industries and utilities. Directions of the waste management strategy: creating conditions for reducing the amount of waste; ensuring the growth of waste use volumes; creation of environmentally safe conditions for storage and disposal of waste.
Topic 6. INTEGRATED SCHEMES FOR THE MSW PROCESSING	Complex of waste processing methods, focused on regional and industry applications. Use combinations of recycling, composting and incineration of waste. Flexibility of the waste management structure. Waste monitoring and control systems, Improving the technical level of waste processing and the creation and implementation of low-waste technologies.

Course Title	**Fundamentals of scientific research / Основы научных исследований**
Course Workload	**2 Credit (72 ac. h.)**
Course contents	
Course Module Title	**Brief Description of the Module Content:**
Topic 1. Fundamentals of the methodology of scientific creativity	Introduction to the methodology of scientific creativity, 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.
Topic 2. Introduction to Information Retrieval Theory	Information, types of information, ascending/descending information flows, the birth of information, the law of information scattering. Search for information, search for information on the Internet, use of libraries and databases.
Topic 3. Empirical methods of knowledge	Methods of empirical knowledge, observation, measurement, measurement scales, measurement errors, the concept of an experiment, experiment planning, processing of experimental results, surveys, interviews, expert surveys, etc.
Topic 4. General requirements for the thesis	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.
Topic 5. Other activities	Methodology of practical activity, methodology of artistic and educational activity, organization of collective activity.