PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA

Institute of Environmental Engineering

Program
OF FINAL STATE ASSESSMENT

Recommended by the Didactic Council for the Education Field of:

05.04.06 Ecology and Nature Management

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

Nature Management

GRADUATE QUALIFICATION:
MASTER

Head of the Program:	**Agreed:**	**Agreed:**
Professor	Head of the Methodological	Director of the Institute
Department of ESandPQM	Council for the Education Field	
Redina M.M.	Kharkamova M.D.	Savenkova E.V.
_____ 2023	_____ 2023	_____ 2023

1. General provisions

1.1. Responsibility and procedures for the preparation and conduct of state final assessment at RUDN, as well as the list, sequence, deadlines for passing the documents required for the state final assessment between structural divisions, determine the Procedure for conducting the final state assessment of students.

1.2. State final assessment for Higher Education Program " Nature Management" Includes the state interdisciplinary exam and defense of the final qualifying work in the form of a master's thesis.

1.3. The results of any of the types of certification tests included in the state final assessment are determined by the marks "excellent", "good", "satisfactory", "unsatisfactory"

2. Aim and tasks of the final state assessment

2.1. The purpose of the state final assessment is to determine the compliance of the results of mastering the Higher Education Program by students with the requirements of the educational standard in the RUDN.

The state final assessment includes a state exam established by the Academic Council of the University, and the defense of the final qualifying work.

2.2. The objectives of the state final assessment are**:**

– checking the quality of personal training in basic natural science laws and phenomena necessary in professional activity;

– determination of the level of theoretical and practical readiness of the graduate to perform professional tasks in accordance with the received qualification;

– establishment of the degree of the individual's desire for self-development, improvement of their qualifications and skills;

– verification of the formation of stable motivation for professional activity in accordance with the types of professional activity provided by the educational standard of the RUDN;

– testing the ability to find organizational and managerial solutions in non-standard situations and willingness to take responsibility for them;

– ensuring the integration of education and scientific and technical activities, improving the efficiency of the use of scientific and technical achievements, reforming the scientific sphere and stimulating innovation;

– ensuring the quality of training in accordance with the requirements of the educational standard of the RUDN.

3. Program of the state examination

3.1. The state exam is conducted in the form of testing and subsequent oral examination, involving answers to "open" questions that require a short answer or a detailed explanation.

3.2. As part of the state exam, the degree of assimilation of graduates of the following competencies is checked: GC-1-7, GPC 1-6, SPC 1-6.

3.3. Scope of the state exam:

- test part - 20 questions randomly selected from a database containing 500 questions; the questions of the test part assume the choice of one correct answer from 3 suggested options.
- oral part - 30 tickets containing 5 questions each.

3.4. Content of the state exam:

The approximate list of questions submitted for the state exam includes:

1. How is state regulation in the field of industrial safety carried out?
2. The role of insurance in ensuring the industrial safety of hazardous industrial facilities.
3. How is the examination of industrial safety of hazardous facilities carried out?

4. How is the certification of hazardous production facilities carried out? What is a safety data sheet? What are the main sections it contains and how is it used?
5. What are the main methods of risk analysis used to analyze the functioning of hazardous industrial facilities? Give examples.
6. What are the stages of risk analysis at hazardous industrial facilities?
7. How is the "failure tree" formed? in what cases can this method of risk analysis be used?
8. The main causes and consequences of accidents and incidents in pipeline transport.
9. The main causes and consequences of accidents in the chemical industry.
10. The main causes of accidents and incidents in transport.
11. The main causes and consequences of accidents in metallurgy.
12. The main causes and consequences of accidents in agriculture.
13. The main causes and consequences of accidents in construction.
14. Environmental assessment and environmental diagnostics of natural and technogenic systems.
15. Classification of natural and technical systems.
16. What risk management methods are used to ensure the safe operation of hazardous industrial facilities?
17. What is the declaration of industrial safety? For what purposes is this document compiled and how is it used?
18. What is an emergency response plan? For what purposes is it created and what is its content?
19. What is a Plan for the elimination of emergency oil and petroleum product spills? For what purposes is it created and what is its content?
20. What is industrial safety expertise? For what objects and situations is it carried out?
21. How is the licensing of activities in the field of industrial safety carried out? What types of activities are subject to licensing?
22. How are the investigation and accounting of emergencies at hazardous industrial facilities carried out?
23. Analysis of anthropogenic load. Determination of the total anthropogenic load
24. The main mechanisms of international cooperation. Contradiction of the basic principles of international law in the field of environmental protection. Levels of international environmental law.
25. UN International Conferences on Environmental Protection and their main outcomes. Rio 92, Johannesburg 2002, Rio 2012.
26. Convention on Biological Diversity. Purpose, objectives, implementation mechanisms, results.
27. Framework Convention on Climate Change. The purpose of the convention. Interests and positions of the main groups of countries. Conditions for ratification of the Kyoto Protocol, obligations under it. Trading quotas. The current state of affairs.
28. UNESCO international initiatives. The program "Man and the Biosphere". The concept of zoning of the biosphere reserve. Convention on the Protection of the World Cultural and Natural Heritage. Cultural and natural criteria for the classification of monuments.
29. Climate projects and programs. Climate risks. Low-carbon development of enterprises.
30. Berne Convention. The purpose and objectives of the Convention. Objects of protection. Application Topics.
31. Convention on the Regulation of Whaling. Goal. Activities of the International Whaling Commission. Moratorium on commercial whaling.
32. The Aarhus Convention. Principles of access to environmental information. The effectiveness of practical application.
33. Non-governmental environmental organizations. IUCN. WWF. The specifics of the activities of each of the organizations, their mission. The main areas of activity and achievements.
34. Current demographic situation in the world and individual regions and related problems

35. Biological diversity and problems related to the reduction of biological diversity. Possible ways to preserve biodiversity on the planet.
36. The main environmental problems associated with the use of hydrocarbons
37. Environmental problems of large cities and possible solutions
38. Modern problems of forestry.
39. Modern problems of specially protected natural territories.
40. Modern global environmental problems. Poverty as a source of environmental problems.
41. Modern problems of energy.
42. Modern problems of waste-free and low-waste technologies.
43. Integrated management systems. The effectiveness of integrated HSE aspects management.
44. The main provisions of the concept of sustainable development
45. Goals, objectives and practical application of environmental regulation.
46. The main directions of environmental regulation and the place of regulation of anthropogenic loads in the environmental management system.
47. The role of environmental regulation for standardization in the field of environmental protection. Development of environmental quality standards.
48. Brief description of the existing environmental rationing system in the Russian Federation. Interaction of Russian and foreign systems of environmental regulation.
49. What is meant by the term "sustainability of natural systems"? What types of resilience do you know? What indicators can be used to assess the degree of sustainability of the natural system?
50. What is environmental standardization? Expand the content of the concept of "standard". What documents can be called standards? Give examples of environmental standards.
51. Give a brief description of the system of standards in the Russian Federation and abroad. What changes have occurred recently in the standardization system in the Russian Federation? Give a brief description of the standardization system in the field of environmental protection in the Russian Federation.
52. What is wastewater? What types of wastewater are subject to regulation and by what indicators?
53. On the basis of which indicators is the assessment of the water quality of reservoirs carried out?
54. What indicators are used when rationing the quality of water bodies and watercourses?
55. How is the required degree of wastewater treatment calculated?
56. How is the rationing of water consumption and discharge carried out at the enterprise?
57. What is the VAT standard? How is it determined?
58. What is the standard of permissible impacts on water bodies?
59. What are the goals of rationing impacts on the atmosphere? What are the main indicators used in the system of rationing impacts on the atmosphere?
60. What is the potential of atmospheric pollution? How is it calculated and used?
61. What is a sanitary protection zone? How are its dimensions regulated?
62. How are PDV standards calculated and approved?
63. Compare the definitions of the concepts of "land", "soil", land resources." What is meant by the standard of land use?
64. What indicators are used to assess the stability of soils? What is an individual soil quality standard? Give examples of assessing the stability of soils.
65. Define waste. What is production waste and consumption waste? Give examples of waste classifications.
66. What is the Project on waste generation standards and limits on their placement? How should it be developed?
67. Basic principles of the formation of effective regional waste management systems.
68. How are the hazard classes of waste determined and for what purposes? What categories of enterprises are distinguished from the point of view of waste generation?
69. Calculation of production waste generation standards: basic methods

70. Environmental safety of waste processing enterprises with energy production.
71. Brief description of the criteria for the state of vegetation and wildlife. Give examples.
72. Household toxicants and their impact on human health.
73. Construction toxicants and their impact on human health.
74. Production and application of food additives from the point of view of environmental toxicology.
75. The relationship of environmental toxicology with human ecology and environmental pathology.
76. The relationship of environmental toxicology with occupational safety.
77. Development of MPC standards for pollutants from the point of view of environmental metrology, toxicology and pathology.
78. Development of MPC standards for pollutants from the point of view of environmental metrology, toxicology and pathology.
79. The system of state preventive measures of toxic lesions. Labor protection.
80. Assessment of workplaces from the point of view of environmental toxicology.
81. Basic concepts: environmental expertise, EIA, environmental justification, environmental audit, environmental support of economic activity, their commonality and differences
82. Organizational and legal bases of environmental expertise and EIA
83. Goals, objectives and principles of environmental assessment
84. Examination procedure
85. Classification of objects of environmental expertise by branches of farms
86. Classification of objects of environmental expertise by the type of exchange of matter and energy between natural geosystems (landscapes) and engineering structures
87. Integrated environmental permits: conditions for issuance, requirements for enterprises and organizations.
88. Assessment of the impact on the atmosphere
89. Assessment of the impact on surface waters
90. Assessment of the impact on groundwater
91. Assessment of geological and other natural processes by the nature of the negative impact on humans and ecosystems
92. Assessment of the impact on the soil cover. Resource criteria
93. Assessment of the impact on the soil cover. Geochemical criteria
94. Assessment of the impact on flora and fauna
95. The content of engineering and environmental surveys in environmental design
96. The composition of engineering and environmental surveys and the content of the technical report
97. Engineering and environmental surveys to substantiate urban development projects
98. Geoecological justification of licenses for nature
use 99. Geoecological justification of industrial facilities on the example of mining and processing of minerals
100. Geoecological design of thermal power facilities
101. Geoecological design of nuclear power facilities
102. Control of the content of radionuclides in environmental objects, products and materials
103. Radiation safety standards: main content and safety requirements.

4. Methodological recommendations for the preparation and passing of the final state exam

4.1. Recommended literature

The list of recommended literature is given in the programs of the disciplines

4.2. Additional recommendations

When preparing for the state exam, it is possible to use software products, use Internet sources.

The use of computer equipment, printed materials, and means of communication is not allowed during the exam.

5. Evaluation tools for the assessment compliance / non-compliance with the level of training of graduates who have completed the mastering of the Higher Education Program in the field of training, with the requirements of the corresponding educational standards in the RUDN / Federal State educational standards for the higher education.

- The list of competencies that students should master as a result of mastering the educational program:

As a result of mastering the master's degree program, the graduate should have general cultural, general professional and specialized professional competencies, incl.:
general competencies (GK):

Competence code	Code and name of the competence achievement indicator
GC-1 - able to carry out a critical analysis of problem situations based on a systematic approach, to develop a strategy of actions.	**GC-1.1** able to analyze a problem situation as a system, identifying its components and the connections between them
	GC-1.2 possesses argumentation and develops a meaningful strategy for solving a problem situation based on systemic and interdisciplinary approaches
	GC -1.3 knows the basics of the strategy and identifies possible risks, suggesting ways to eliminate them
GC-2 - able to manage the project at all stages of its life cycle.	**GC -2.1** able to formulate a project task based on the problem posed and the way to solve it
	GC-2.2 able to develop a project concept, formulates a goal, tasks, justifies the relevance, expected results and scope of their application
	GC-2.3 knows how to develop a project implementation plan taking into account possible risks, plans the necessary resources
GC-3 - able to organize and manage the work of the team, developing a team strategy to achieve the goal	**GC -3.1** knows the techniques and methods of teamwork, organizes the selection of team members to achieve the goal
	GC -3.2 able to organize and adjust the work of the team, including on the basis of collegial decisions
	GC-3.3 able to delegate authority to team members and distributes assignments, gives feedback on the results, takes responsibility for the overall result
GC-4. Able to apply modern communication technologies, including in a foreign language(s) for academic and professional interaction	**GC-4.1** able to establish contacts and organize communication in accordance with the needs of joint activities, using modern communication technologies
	GC -4.2 knows the basics of business documentation and uses professional vocabulary in foreign and Russian languages
	GC -4.3 able to organize discussion of results and present the results of research and project activities at various public events in Russian or a foreign language, choosing the most appropriate format
GC-5 able to analyze and take into account the diversity of	**GC-5.1.** knows the main categories of philosophy, the laws of historical development, the basics of intercultural communication

cultures in the process of intercultural interaction.	**GC-5.2** able to communicate in the world of cultural diversity and demonstrate mutual understanding between students from different cultures in compliance with ethical and intercultural norms
	GC-5.3. has practical skills in analyzing philosophical and historical facts, assessing cultural phenomena; ways of analyzing and revising his views in case of disagreements and conflicts in intercultural communication
GC-6 - able to determine and implement the priorities of his own activities and ways to improve it based on self-assessment.	**GC-6.1** able to assess his resources and their limits (personal, situational, temporary), makes reasonable use of them
	GC-6.2 able to identify educational needs and ways to improve their own (including professional) activities based on self-assessment
	GC-6.3 has the skills to build a flexible professional trajectory, taking into account the accumulated experience of professional activity, dynamically changing requirements of the labor market and personal development strategy
GC-7. able to use digital technologies and methods of search, processing, analysis, storage and presentation of information (in the field of ecology and nature management) in the digital economy and modern corporate information culture.	**GC--7.1** has skills in using digital technologies and search methods
	GC--7.2 is able to process, analyze, store and correctly present information
	GC--7.3 knows the principles and techniques of modern corporate information culture and the basics of the digital economy

general professional competencies (GPC):

Competence code	Code and name of the competence achievement indicator
GPC-1. Able to use philosophical concepts and methodology of scientific knowledge in the study of various levels of organization of matter, space and time.	**GPC -1.1** Knows the philosophical concepts of natural science and the methodology of scientific knowledge,
	GPC -1.2 Able to use in-depth knowledge of the philosophical concepts of natural science in assessing the consequences of their professional activities
	GPC -1.3 Able to apply the acquired knowledge in their research activities, to make correct generalizations and conclusions
GPC -2. Able to use special and new sections of ecology, geoecology and nature management in solving research and applied problems of professional activity.	**GPC -2.1** Knows the basics of ecology, geoecology, environmental economics and circular economy, as well as environmental management
	GPC -2.2 Able to use environmental, economic and other special knowledge and algorithms to solve professional problems
	GPC -2.3 Able to find, analyze and competently use the latest information and modern techniques in the performance of research and applied tasks
GPC -3. Able to apply environmental research methods to solve research and	**GPC -3.1** Knows the principles and methods of environmental monitoring of environmental components
	GPC -3.2 Owns analytical methods for monitoring pollutants and physical impacts and processing the information received

applied problems of professional activity.	**GPC -3.3** Able to develop systems for environmental monitoring and control in production and solve applied problems in professional activities
GPC -4. Able to apply regulatory legal acts and norms of professional ethics in the field of ecology and nature management.	**GPC -4.1** Knows the basics of environmental regulation and the basics of legislation in the field of nature management
	GPC -4.2 Knows how to use and apply regulatory legal acts in the field of ecology and nature management
	GPC -4.3 Able to use the norms of professional ethics in their professional activities
GPC -5. Able to solve the problems of professional activity in the field of ecology, nature management and nature protection using information and communication, including geoinformation technologies.	**GPC -5.1** Knows how to choose and apply an algorithm for solving environmental problems and implements algorithms using software
	GPC -5.2 Able to use information technology tools to search, store, process, analyze and present information
	GPC -5.3 Knows how to process Earth remote sensing data and use cartographic materials, owns modern GIS technologies
GPC -6 Able to design, represent, protect and disseminate the results of their professional activities, including research.	**GPC -6.1** Able to receive, analyze, summarize the necessary scientific information using modern research methods, present their own results in the form of scientific articles and public speeches
	GPC -6.2 Possesses the skills of an oral report and presentation of the results of project and scientific activities, fluency in the material
	GPC -6.3 Knows the methodological foundations of scientific research, the requirements of copyright and scientific ethics

specialized professional competencies (SPC):

Код и наименование компетенции выпускника	**Код и наименование индикатора достижения компетенции**
В **организационно-управленческой деятельности**:	
SPC -1 The ability to formulate problems, tasks and methods of scientific research, summarize the results obtained, formulate conclusions and practical recommendations based on research results	**SPC -1.1** Knows the basics of research planning methodology
	SPC -1.2 He is able to summarize the results obtained, formulate conclusions and practical recommendations based on the results of research
SPC-2 The ability to creatively use knowledge of fundamental and applied sections of special disciplines in production and technological activities	**SPC -2.1** Has the skills of applying advanced scientific achievements to select and implement the best available technologies (BAT)
SPC-3 Knowledge of the basics of design, expert-analytical activity and research using modern approaches and methods, equipment and computer systems	**SPC -3.1** Is able to plan the implementation of modern approaches and methods, equipment and computer systems for solving problems in the professional field
	SPC -3.2 Owns the basics of design and expert-analytical activity
SPC -4 Is able to use modern methods of processing and interpretation of	**SPC -4.1** Is able to apply modern methods of processing and interpretation of environmental

environmental information during scientific and industrial research	information when conducting industrial research
	SPC -4.2 Is able to interpret the obtained research results from the point of view of compliance with safety and performance indicators
	SPC -4.3 Has the skills of conducting control and supervisory activities based on modern methods of processing environmental information
SPC -5 Is able to develop standard environmental protection measures and assess the impact of planned structures or other forms of economic activity on the environment	**SPC -5.1** Is able to develop and plan the implementation of standard environmental measures taking into account international practice and the requirements of national legislation
	SPC -5.2. Has the skills to assess the impact of planned structures or other forms of economic activity on the environment
	SPC -5.3 Knows the requirements for the preparation and implementation of environmental modernization programs of enterprises, the introduction of BAT, the organization of environmental monitoring, accounting and reporting
SPC-6 Able to diagnose problems of nature protection, develop practical recommendations for its protection and sustainable development	**SPC -6.1** It is able to detect inconsistencies in the state of environmental components with the requirements of national and international standards
	SPC-6.2 Is able to develop programs for monitoring natural complexes under conditions of man-made loads and programs for environmental rehabilitation of territories

Standard tasks or other materials necessary to assess the results of the development of the educational program are presented in the programs of disciplines.

Methodological materials defining the procedures for evaluating the results of the development of the educational program are presented in the programs of the disciplines.

The scale of assessment for an oral answer on an interdisciplinary exam:

The score "excellent" is put if*:*

- the content of the examination card material is fully disclosed;
- the material is presented correctly, in a certain logical sequence;
- demonstrated a systematic and in-depth knowledge of the program material; terminology is accurately used; the ability to illustrate theoretical positions with concrete examples is shown, to apply them in a new situation;
- demonstrated the assimilation of previously studied related issues, the formation and stability of competencies, skills and abilities;
- the answer sounded independently, without leading questions;
- demonstrated the ability to creatively apply knowledge of theory to solving professional problems;

- • demonstrated knowledge of modern educational and scientific literature;
- one or two inaccuracies were made in the coverage of minor issues, which are corrected according to the remark.

The score “good” is given if:

- the questions of the examination material are presented in a systematic and consistent manner; the ability to analyze the material is demonstrated, but not all conclusions are reasoned and evidence-based; the assimilation of the main literature is demonstrated.
- the answer mainly meets the requirements for a rating of "5", but at the same time has one of the drawbacks:
- there are small gaps in the presentation that did not distort the content of the answer;
- one or two shortcomings were made when covering the main content of the response,
- corrected by the examiner's remark;
- an error or more than two shortcomings were made when covering minor issues,
- which are easily corrected by the examiner's remark.

The score “satisfactory” is given if:

- the content of the material is not fully or inconsistently disclosed, but a general understanding of the issue is shown and skills sufficient for further assimilation of the material are demonstrated;
- the main categories on the considered and additional issues have been mastered;
- there were difficulties or mistakes in the definition of concepts, the use of terminology, corrected after several leading questions;
- with incomplete knowledge of the theoretical material, insufficient formation of competencies, skills and abilities has been revealed, the student cannot apply the theory in a new situation;
- the assimilation of the basic literature is demonstrated.

- **The score “unsatisfactory” is given if:**
  - the main content of the training material has not been disclosed;
  - ignorance or misunderstanding of the most or most important part of the educational material is detected;
  - mistakes were made in the definition of concepts, when using terminology, which were not corrected after several leading questions.
  - competencies, skills and abilities are not formed.

6. Requirements for the final qualifying work

6.1. A student who has passed the state exam is allowed to defend the final qualifying work. The defense of the final qualifying work is conducted at an open meeting of the State Examination Commission.

The state final assessment is carried out in the form of an oral presentation of the final qualifying work, followed by oral answers to the questions of the members of the State Examination Commission in accordance with the University's Regulations on final qualifying work. The report and/or answers to the questions of the members of the State Examination Commission may be in a foreign language.

6.2. As part of the defense of the thesis, the degree of development of graduates of the following competencies is checked:

GC 1-7; GPK 1-6; SPC 1-6.

An approximate list of topics of theses:

- Comparative analysis of environmental standards of air quality

• Criteria and indicators of ecological and economic efficiency of the enterprise
Comparative analysis of environmental standards of water quality
• Environmental assessment of the company's environmental impact: international practice
• Ecological justification of the choice of environmental protection technologies (on the example of a specific enterprise)
• Assessment of the effectiveness of the environmental management system of the enterprise/ organization
• Ways to reduce and neutralize gas-air emissions from domestic wastewater treatment plants
• Environmental risks at hydrocarbon storage facilities
• Ecological and economic assessment of plans for the prevention and elimination of emergency oil and petroleum product spills on land
• Ecological and economic assessment of plans for the prevention and elimination of emergency oil and petroleum product spills in the waters of water bodies
• Analysis of environmental risks of metalworking enterprises
• Ecological and economic justification of the use of various types of sorbents for oil collection
• Ecological and economic aspects of the introduction of "green" construction technologies
• Comparative evaluation of programs to improve the environmental efficiency of enterprises
• Product life cycle assessment (using the example of individual types of products)
• Product lifecycle management (using the example of individual types of products)
• Justification of the company's environmental policy
• Development of the occupational health and safety management system at the enterprise (on the example of a specific enterprise)
• Justification of the choice of BAT (on the example of a specific enterprise/ type of technology)
• Evaluation of the effectiveness of integrated management systems in the enterprise
• Evaluation of the efficiency of waste management systems at the enterprise
• Assessment of environmental safety of waste disposal technologies
• Implementation of foreign experience for the environmental improvements in the industrial enterprises (example of a branch of economy)

6.1. Tasks that the student must solve in the process of completing the thesis:

1) in-depth analysis of literary sources on the subject of the study;
2) independent formulation of research goals and objectives;
3) application of theoretical knowledge and practical skills, a set of acquired competencies for the analysis of the research object;
4) independent calculations, including with the use of specialized software systems, if this is provided by the direction of the work;
5) interpretation of calculation results;
6) formulation of conclusions based on the results of the work;
7) presentation of work results.

6.2. Stages of completion of the final qualifying work

The conditions for admission of the student to the defense procedure, the requirements for the structure, volume, content and design, as well as the list of mandatory and recommended documents submitted for defense are specified in the guidelines approved in accordance with the established procedureю

6.5 Evaluation tools.

- the list of competencies that students should master as a result of mastering the educational program: a set of general cultural, general professional and professional competencies GC1-GC7, GPC1-OPC6, SPC1-SPC6.
- description of indicators and criteria for assessing competencies, as well as assessment scales;

- standard tasks or other materials necessary to assess the results of the development of the educational program are given in the programs of disciplines included in the curriculum of the Higher Education Program “Economics of natural resources management” in the direction 05.04.06 "Ecology and environmental management";
- methodological materials defining the procedures for evaluating the results of the development of the educational program.

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

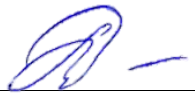
DEVELOPER:

Professor Department of ESandPQM		**Redina M.M.**

HEAD OF THE DEPARTMENT:

of ESandPQM		Savenkova E.V.

HEAD OF THE PROGRAM:

Professor Department of ESandPQM		**Redina M.M.**