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Информация о владельце:  
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Должность: Ректор  
Дата подписания: 29.05.2026 16:21:54  
Уникальный программный ключ:  
ca953a0120d891083f939673078ef1a989dae18a

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

**Institute of Environmental Engineering**

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**FINAL STATE EXAMINATION SYLLABUS**

**Recommended by the Didactic Council for the Education Field of:**

05.04.06 "Ecology and Nature Management"

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**The final state examination is implemented within the professional education program  
of higher education:**

«Climate Projects Management»

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## 1. FINAL STATE EXAMINATION GOAL AND TASKS

**The goal** of the final state examination within the framework of the higher education programme implementation is to check the conformity of the students' training outcomes as the programme results with the relevant requirements of the Federal State Educational Standard of the Higher Education or the RUDN University Educational Standards.

**The tasks** of the final state examination include the following:

- checking the quality of teaching a person basic humanitarian knowledge, natural science laws and phenomena necessary for professional activities of a graduate;
- identifying the level of theoretical and practical readiness of a graduate to perform professional tasks in compliance with the qualification obtained;
- establishing the degree of a person's desire for self-development, improving his or her qualifications and skills;
- exploring the formation of a graduate's sustainable motivation for professional activities in compliance with the types of tasks of professional activities provided for by the Federal State Educational Standard of the Higher Education or the RUDN University Educational Standards;
- assessing the level of graduates' ability to find organizational and managerial solutions in non-standard situations and evaluating graduates' readiness to bear responsibility for them;
- ensuring the integration of education and scientific and technical activities, increasing the efficiency of scientific and technological achievements use, reforming the scientific sphere and stimulating innovation;
- ensuring the quality of specialists' training in compliance with the requirements of the Federal State Educational Standards of the Higher Education or the RUDN University Educational Standards.

## 2. REQUIREMENTS FOR HIGHER EDUCATION PROGRAMME COMPLETION AND LEARNING OUTCOMES

A student who does not have failed tests or exams and who has fully completed the curriculum or the individual curriculum of the higher education programme is allowed to the final state examination.

On the higher education programme completion the graduate is expected to master the following **generic competences** (GC):

<b>Code and name of the competence</b>
GC-1. Able to carry out a problem situations critical analysis based on a systematic approach, able to develop an action strategy
GC-2. Able to manage a project at all of its life cycle stages
GC-3. Able to organize and manage the team work, developing a team strategy to achieve the goal
GC-4. Able to apply modern communication technologies, including foreign language(s) for academic and professional interaction
GC-5. Able to analyze and consider the cultures diversity in the intercultural interaction process
GC-6. Able to identify and implement the priorities of their own activities and ways to

<b>Code and name of the competence</b>
improve it based on self- assessment
GC-7. Able to find the necessary sources of information and data as well as to perceive, analyze, remember and transmit information using digital tools. Able to control information, its reliability, drawing logical conclusions based on incoming information and data, when working with information obtained from various data sources

**- general professional competencies (GPC):**

<b>Code and name of the competence</b>
GPC-1. Able to use philosophical concepts and methodology of scientific creation on the various levels of matter, space and time study
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-3. Able to apply environmental research methods to solve research and applied problems of professional activity
GPC-4. Able to apply regulatory legal acts and norms of professional ethics in the field of ecology and nature management
GPC-5. Able to solve the professional activity problems in ecology, environmental management and protection using information and communication, including geoinformation technologies
GPC-6. Able to design, represent, protect and disseminate the results of the professional activities, including research

**- professional competencies (PC):**

<b>Code and name of the competence e</b>
PC-1 Able to organize and manage the enterprise activities using in-depth knowledge in the field of greenhouse gas management
PC-2 Able to develop and economically argue plans for the new environmental equipment and technology's introduction to achieve enterprise carbon neutrality
PC-3 Able to develop measures for the economic regulation of the enterprise's environmental performance, as part of the transition to a low-carbon economy
PC-4 Able to conduct environmental analysis of projects for expansion, reconstruction, modernization of existing production facilities, taking into account the requirements of the greenhouse gas management standards
PC-5 Able to develop measures to minimize possible risks of climate change for conducting various types of economic activities
PC-6 Able to develop projects based on existing methods for solving geoinformation problems, use modern cloud services and analytical tools to update climate data

### **3. FINAL STATE EXAMINATION PROCEDURE**

The final state examination can be conducted both in in-person format (students and the state examination committee are at RUDN University during the examination), and through the use of distance learning technologies (DLT) available in the RUDN Electronic Information and Educational Environment.

The procedure for in-person or DLT-facilitated final state examination is regulated by the relevant local normative act of the RUDN University.

The final state examination within the framework of the higher education programme includes:

- state exam
- defence of the graduation qualifying paper (degree thesis). It can be conducted both in full-time format, and using distance learning technologies.

Final state examination procedure is held at the RUDN University.

#### **4. STATE EXAM PROCEDURE**

The total workload of the State Exam is 6 credits.

The state exam is held in one or more disciplines and (modules) of the higher education programme, whose mastery bears a decisive importance for graduates' occupational performance.

The state exam is held in two stages:

**The first stage** includes the assessment of the level of a graduate's theoretical training in the form of **computer testing** through the tools available in the RUDN Electronic Information and Educational Environment (EIEE).

**The second stage** focuses on the assessment of the graduate's practical preparation for future occupational activities in the form of **solving work-related situational problems (cases)**.

In order to prepare students for taking the state exam, the head of the educational programme (no later than one calendar month before the start of the final state examination) shall familiarise the graduate students with the final state examination syllabus, the comprehensive list of theoretical issues included in the state exam, examples of work-related (occupational) situational tasks (cases) that the students will have to solve in the process of taking the state exam, as well as with the procedure for each stage of the state exam and the grading system for evaluating its results (with assessment materials).

Before the state exam, students are offered consultations on issues and tasks included in the state exam (mandatory pre-exam consultation).

The state exam results evaluation is carried out in accordance with the methodology set forth in the assessment toolkit that is specified in the Appendix to this syllabus.

#### **5. REQUIREMENTS FOR GRADUATION QUALIFYING PAPER (DEGREE THESIS) AND PROCEDURE FOR ITS DEFENCE**

The degree thesis is a graduation qualifying paper that the student (several students in a team) prepare to demonstrate his/her/their level of competence and work readiness.

The list of degree theses themes offered to students for further work is approved by the order of the head of the educational division (faculty/institute/academy) that runs the higher education programme, the respective information is delivered to the students by the programme head no later than six months before the date of the final state examination start.

The students are allowed to suggest their own themes for the theses, under the set procedure.

The student who has passed the state exam is admitted to defend the graduation degree thesis.

The student (students) is/are allowed to defend his/ her/their thesis only if this fully completed degree paper is signed by the respective graduate (s), the supervisor, the consultant (if any), the heads of the educational department and educational division; the thesis is also subject to the external review procedure (mandatory for master's and specialist's programmes)

and the plagiarism check (in the "Anti-plagiarism" system). The review of the graduation qualifying paper supervisor shall be attached as well, with a specific emphasis laid on the graduate's activities in the course of the degree thesis drafting.

No later than 14 days before the date of the thesis defence, a rehearsal of the procedure is held at the presence of the degree thesis supervisor and other academic staff of the educational department, in order to timely identify and eliminate shortcomings in the structure, content and design of the degree thesis.

The degree theses are introduced to the State Examination Board members at the public defence procedure. It includes the students' oral reports with mandatory multimedia (graphic) presentations that introduce the thesis main content.

At the end of the reports, the students reply orally to the State Examination Board members' questions regarding the subject, structure, content of the paper and the profile/specialisation of the higher education programme. The reports and / or answers to the Board members' questions may be delivered in a foreign language.

The stages of the graduation qualifying paper preparation, the requirements for its structure, volume, contents and design, as well as the list of mandatory and recommended documents submitted for defense are specified in the relevant guidelines.

The evaluation of the degree thesis defense results is carried out in accordance with the methodology set forth in the assessment toolkit that is specified in the Appendix to the syllabus.

## **6. REQUIREMENTS FOR EQUIPMENT AND TECHNOLOGY SUPPORT FOR FINAL STATE EXAMINATION**

To prepare for the final state examination, students can use the educational portal of the RUDN University.

## **7. RESOURCES RECOMMENDED FOR FINAL STATE EXAMINATION**

*The main reading :*

1. Hurteau M. D., Letcher T. M. Climate Change: Observed Impacts on Planet Earth. – 2021. URL:

<https://books.google.com/books?hl=en&lr=&id=psr2DwAAQBAJ&oi=fnd&pg=PP1&dq=climate+change+models+book&ots=yCwibhOE57&sig=2QHegfwy2GyHxkOWmpcll420UUU>

2. Schaltegger S. et al. Corporate sustainability management accounting and multi-level links for sustainability—A systematic review //International journal of management reviews. – 2022. – T. 24. – №. 4. – C. 480-500. URL: <https://doi.org/10.1111/ijmr.12288>

3. Banerjee A, Meena RS, Jhariya MK, Yadav DK, editors. Agroecological footprints management for sustainable food system. Singapore: Springer; 2021.

4. Letcher Trevor, ed. "Climate change: observed impacts on planet Earth." (2021). <https://books.google.com/books?hl=en&lr=&id=psr2DwAAQBAJ&oi=fnd&pg=PP1&dq=climate+change+models+book&ots=yCwibhOE57&sig=2QHegfwy2GyHxkOWmpcll420UUU>

5. Johannes Bednar, Michael Obersteiner, Artem Baklanov, Marcus Thomson, Fabian Wagner, Oliver Geden, Myles Allen & Jim W. Hall Operationalizing the net-negative carbon economy 2021 <https://doi.org/10.1038/s41586-021-03723-9>

6. Phara Guberman, Kenneth Breen, and Kaitlyn O'Malley, Cadwalader, Wickersham & Taft LLP, Climate Risk and the Transition to a Low-Carbon Economy Harvard Law School Forum on Corporate Governance 2024 Insider Trading and Off-Channel Communications in the Age of Remote and Hybrid Work Environments (harvard.edu)

7. E.O. Wilson , Dawn J. Wright , Christian Harder GIS for Science, Volume 3: Maps for Saving the Planet. Esri Press, 2021

8. Building Postcarbon Futures: Land, Justice, and Energy Transitions. Billy Fleming. Lincoln institute 2026

9. Climate Change 2021 – The Physical Science Basis. 5 - Global Carbon and Other Biogeochemical Cycles and Feedbacks. Cambridge University Press: 2023

10. A Climate of Truth: Why We Need It and How to Get It. Mike Berners-Lee. Cambridge Univ. Press (2025)

*Additional reading:*

1. ISO 14064-1:2018 Greenhouse gases. Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals

2. ISO 14064-2:2019 Greenhouse gases. Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements

3. ISO 14064-3:2019 Greenhouse gases. Part 3: Specification with guidance for the verification and validation of greenhouse gas statements

4. ISO 14067:2018 . Greenhouse gases. Carbon footprint of products. Requirements and guidelines for quantification

5. Krauss M, Wiesmeier M, Don A, Cuperus F, Gattinger A, Gruber S, Haagsma WK, Peigné J, Palazzoli MC, Schulz F, van der Heijden MG. Reduced tillage in organic farming affects soil organic carbon stocks in temperate Europe. Soil and Tillage Research. 2022 Feb 1;216:105262

6. Bertram G, Terry S. The carbon challenge: New Zealand's emissions trading scheme. Bridget Williams Books; 2021 May 24

7. Zaman M, Heng L, Müller C. Measuring emission of agricultural greenhouse gases and developing mitigation options using nuclear and related techniques: Applications of nuclear techniques for GHGs. Springer Nature; 2021

8. Bonan, Gordon. Climate change and terrestrial ecosystem modeling. Cambridge University Press, 2019. URL:

[https://books.google.ru/books?hl=en&lr=&id=BYaEDwAAQBAJ&oi=fnd&pg=PR13&dq=climate+change+models+book&ots=gqnEFggQpr&sig=TP5ls7cjtY1GfgwDDd-kj756dh4&redir\\_esc=y#v=onepage&q=climate%20change%20models%20book&f=false](https://books.google.ru/books?hl=en&lr=&id=BYaEDwAAQBAJ&oi=fnd&pg=PR13&dq=climate+change+models+book&ots=gqnEFggQpr&sig=TP5ls7cjtY1GfgwDDd-kj756dh4&redir_esc=y#v=onepage&q=climate%20change%20models%20book&f=false)

9. Ahmetoğlu S, Tanık A. Management of carbon footprint and determination of GHG emission sources in construction sector. International Journal of Environment and Geoinformatics. 2020 Aug 8;7(2):191-204. <https://doi.org/10.30897/ijegeo.726913>

10. Sengupta, Piyali & Choudhury, Binoy & Mitra, Sarbani & Agrawal, Krishna. (2019). Low Carbon Economy for Sustainable Development. 10.1016/B978-0-12-803581-8.11217-2

11. Janet Ranganathan, Ciara Raudsepp-Hearne, Nicolas Lucas, Frances Irwin, Monika Zurek, Karen Bennett, Boyd J., Banzhaf S. What are ecosystem services? // Ecol. Economics. 2007. Vol. 63, No. 23. P. 616-626

12. Daily G.C. Introduction: What are Ecosystem Services? // Nature's Services: Societal Dependence on Natural Ecosystems / Ed by G.C. Daily. Washington (DC): Island Press, 1997. P. 1-10.

13. Fisher B., Turner R.K., Morling P. Defining and classifying ecosystem services for decision making // Ecol. Econ. 2009. Vol. 68.P. 643-653.

14. Remote Sensing and Image Interpretation, 7th Edition, Thomas Lillesand , Ralph W. Kiefer , Jonathan Chipman

15. Prasad S. Thenkabail, PhD United States Geological Survey (USGS) REMOTELY SENSED DATA CHARACTERIZATION, CLASSIFICATION, AND ACCURACIES 2016 by Taylor & Francis Group, LLC CRC Press is an imprint of Taylor & Francis Group, an Informa business 78-1-4822-1787-2 (eBook - PDF) 2250 p

16. Methodology climate projects. [http://www.igce.ru/performance/издательская-деятельность/methodology\\_of\\_climate\\_projects](http://www.igce.ru/performance/издательская-деятельность/methodology_of_climate_projects)

17. Guidebook on Quantifying GHG Reductions at Project Level (Partners for Climate Protection)

18. Carbon and Other Biogeochemical Cycles. (2013).  
<https://doi.org/10.1017/cbo9781107415324.015>

19. Impact of tropospheric sulphate aerosols on the terrestrial carbon cycle.  
[http://downloads.igce.ru/journals/FAC/FAC\\_2017/FAC\\_2017\\_4/Eliseev\\_A\\_V\\_FAC\\_2017\\_4.pdf](http://downloads.igce.ru/journals/FAC/FAC_2017/FAC_2017_4/Eliseev_A_V_FAC_2017_4.pdf)

20. Kanianska R. Green Growth and Green Economy. Textbook to the course Green growth and green economy. Belianum: Banská Bystrica. 2017

21. Kharlamova M.D. Kurbatova A.I Modern Technologies of Waste Management, Recycling and Environmental Protection / Modern methods of waste management, recycling and environmental protection - M.: RUDN University, 2017. - 98 p.: ill. Text/electronic resource RUDN Library

22. L.G. Canin A.V. Engineering ecology: protection of the lithosphere from solid industrial and household waste. Tutorial. M., INFRA-M. 2018, -556 p.

*Resources of the information and telecommunications network "Internet":*

1. ELS of RUDN University and third-party ELS, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System - RUDN EBS <http://lib.rudn.ru/MegaPro/Web>
- ELS "University Library Online" <http://www.biblioclub.ru>
- EBS Yurayt <http://www.biblio-online.ru>
- ELS "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru)
- EBS "Lan" <http://e.lanbook.com/>
- EBS "Trinity Bridge"

2. Databases and search engines:

- electronic fund of legal and normative-technical documentation <http://docs.cntd.ru/>
- Yandex search engine [https:// www .yandex.ru/](https://www.yandex.ru/)
- Google search engine <https://www.google.ru/>
- abstract database SCOPUS [http:// www .elsevierscience.ru/ products / scopus /](http://www.elsevierscience.ru/products/scopus/)

## **8. ASSESSMENT TOOLKIT AND GRADING SYSTEM\* FOR EVALUATION OF GRADUATES' COMPETENCES LEVEL**

Evaluation materials and a point- rating system\* for assessing the level of competence formation for the final certification are developed at RUDN University and presented in the relevant resources of the university.

### **DEVELOPER:**

Professor of ES&PQM  
Department

Position

**Redina M.M.**

Signature

Name, Surname

### **HEAD OF DEPARTMENT:**

Director of ES&PQM Department

Position

**Savenkova E.V.**

Signature

Name, Surname

### **HEAD OF EP HE:**

Director of ES&PQM Department

Position

**Savenkova E.V.**

Signature

Name, Surname