PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE LUMUMBA

Institute of Environmental Engineering

(наименование основного учебного подразделения (ОУП)-разработчика ОП ВО)

COURSE SYLLABUS

Management of environmental-economic risks / Управление эколого-экономическими рисками

(наименование дисциплины/модуля)

Recommended by the Methodological Council for the Education Field:

05.04.06 Ecology and nature management

(код и наименование направления подготовки/специальности)

The discipline is mastered within the framework of the main professional higher education program:

Economics of natural resources management

(наименование (профиль/специализация) ОП ВО)

2025

1. COURSE GOALS

The purpose of the discipline is to get acquainted with current state of the energy sector development, environmental and resource problems and strategies of their elimination. Also the climate protection issues are included into this course in a part of estimation of a carbon footprint of energy sector objects.

2. LEARNING OUTCOMES

The mastering of the discipline "Management of environmental-economic risks / Управление эколого-экономическими рисками" is aimed at the formation of the following competencies (parts of competencies) in students:

Table 2.1. List of competencies formed by students during the development of the discipline (LEARNING OUTCOMES)

Code	Competence	Indicators of competence achievement (within the framework of this discipline)
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
GPC-6	Able to develop standard environmental measures and assess the impact of planned facilities or other forms of economic activity on the environment	**SPC-6.1** Capable of detecting inconsistencies in the state of environmental components with the requirements of national and international standards
		SPC-6.2 Able to develop programs for monitoring natural complexes under conditions of technogenic loads and programs for environmental rehabilitation of territories
PC-3	mastery of the basics of design, expert-analytical activities and research using modern approaches and methods, equipment and computer systems	**PC-3.1** Able to identify indicators that can have a negative impact on the environment
		PC-3.2 Able to develop standard environmental protection measures
		PC-3.3 Able to analyze environmental monitoring data, draw preliminary conclusions about the state of the facility and the environment
PC-5	ability to develop standard environmental protection measures and assess the impact of planned structures or other forms of economic activity on the environment	**PC-5.1** Умеет проводить оценку воздействия на окружающую среду проектируемого предприятия и сооружений, прогнозировать и оценивать негативные последствия
PC-6	ability to diagnose environmental problems, develop practical recommendations for its protection and sustainable development	**PC-6.1** Capable of carrying out the necessary calculations for planning, modeling and forecasting the development of a territorial object

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline “Management of environmental-economic risks / Management of environmental-economic risks” refers to the variable part.

Within the framework of the higher education program, students also master other disciplines and/or practices that contribute to expected learning outcomes of the discipline "Management of energy resources".

Table 3.1. List of Higher Education Program components that contribute to expected learning outcomes

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
GC-6	Able to determine and implement the priorities of his own activities and ways to improve it based on self-assessment.	Methodology of Scientific Creation Software Tools for Waste Management	Preparing and Passing the State Exam /
GPC-6	Able to develop standard environmental measures and assess the impact of planned facilities or other forms of economic activity on the environment	Methodology of Scientific Creation	Research Work / Preparing and Passing the State Exam /
PC-3	mastery of the basics of design, expert-analytical activities and research using modern approaches and methods, equipment and computer systems	Regional & Municipal MSW Management Systems /	Preparing and Passing the State Exam /
PC-5	ability to develop standard environmental protection measures and assess the impact of planned structures or other forms of economic activity on the environment	/Environmental impact assessment (EIA) of SWM objects Mapping And GIS-technologies in MSW Management Remote Sensing of MSW Objects /	Preparing and Passing the State Exam /
PC-6	ability to diagnose environmental problems, develop practical recommendations for its protection and sustainable development	Regional & Municipal MSW Management Systems / Basics of Circular Economics / Green Economy and Tools for Enterprises Sustainable Development	Preparing and Passing the State Exam /

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

Workload of the course «Management of energy resources» is 2 ECTS.

Table 4.1. Types of academic activities during the period of the HE program mastering

Вид учебной работы		TOTAL	Semesters			
			1	2	3	4
Contact academic hours		*17*			*17*	
Incl.:						
Lectures		17			17	
Lab work						
Seminars		34			34	
Self-study		*30*			*30*	
Evaluation and assessment		*27*			*27*	
Total workload	Ac.hours	**108**			**108**	
	ECTS	**3**			**3**	

5. COURSE CONTENTS

Table 5.1. The content of the discipline (module) by type of academic work

Name of the discipline section	Content of the section (topics)	Type of academic activity*
Introduction	The concept of environmental risks. Enterprise risks and their assessment	L,S
	Project risks, their minimization and the need to take into account when analyzing the sustainability of investment projects	
Risk analysis and assessment	Environmental and economic risks and methods of their analysis and assessment	L,S
	Risk identification. Risk factors	
	Economic characteristics of environmental risks	
Environmental risk and environmental projects	Risks of environmental and industrial safety in investment projects	L,S
	Climate risks.	
Risk management in environmental management	Management of risks. Environmental insurance	L,S
	Minimizing environmental risks for sustainable operation of enterprises	
Minimizing environmental risks	Minimizing environmental risks and implementing environmental management systems	L,S

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom equipment and technology support requirements

Classroom for Academic Activity Type	CLASSROOM EQUIPMENT	Specialized learning, laboratory equipment, software and materials for the mastering the course
Lections	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentations.	A set of specialized furniture; chalk board; technical equipment: HP PRO system unit, HP-V2072A monitor, LUMIEN retractable projection screen,
Seminars	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes	

Classroom for Academic Activity Type	CLASSROOM EQUIPMENT	Specialized learning, laboratory equipment, software and materials for the mastering the course
	portable multimedia projector, laptop, projection screen, Stable wireless Internet connection. Software: Microsoft Windows, MS Office / Office 365, MS Teams, Chrome (latest stable release), Skype	Internet access. Microsoft Windows 7 corporate. License No. 5190227, date of issue 03/16/2010
Self-studies	An auditorium for independent work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to an electronic information and educational environment.	-

7. RECOMMENDED SOURCES FOR COURSE STUDIES

Main reading:

1. Van Gestel C. A. M. et al. Environmental toxicology, an open online textbook. – 2019..
2. Koutsoyiannis D. Stochastics of Hydroclimatic Extremes–A Cool Look at Risk [Undergraduate textbook]. Athens: Kallipos, Open Academic Editions. – 2021.
Coolsaet B. (ed.). Environmental justice: key issues. – Routledge, 2020./

Additional sources:

1. Ackermann T., Andersson G., Soder L. (2001): Distributed Generation: A Definition. In: *Electric Power System Research*, Vol. 57 (2001), pp. 195-204.
2. Anderson W., White V., Finney A. (2010): 'You just have to get by': Coping with low incomes and cold homes. University of Bristol. https://core.ac.uk/download/pdf/29025974.pdf.
3. Bashmakov (2009): Resource of energy efficiency in Russia: scale, costs, and benefits. Energy Efficiency 2, 369–386. www.mdpi.com/journal/sustainability. In: section 7.6.2 Climate Change 2014: Mitigation of Climate Change. Intergovernmental Panel on Climate Change. http://www.ipcc.ch/report/ar5/wg3/
4. BlackRock (2017): *BlackRock. Black Rock Investment Stewardship engages on Climate Risk*. https://www.blackrock.com/corporate/en-us/literature/market-commentary/how-blackrock-investment-stewardship-engages-on-climate-risk-march2017.pdf
5. Blok, K., Hofheinz, P., Kerkhoven, J. (2015): *The 2050 Energy Productivity and Economic Prosperity Index. How Efficiency Will Drive Growth, Create Jobs and Spread Wellbeing Throughout Society*. https://www.ecofys.com/files/files/the-2015-energy-productivity-andeconomic-prosperity-index.pdf
6. Bloomberg New Energy Finance (2017): *New Energy Outlook 2017*. https://about.bnef.com/new-energy-outlook/
7. Bondarak J. (2016): *Poland Coal Sector Update*. Presented at the Global Methane Initiative Coal Subcommittee Meeting 24 October 2016. https://www.unece.org/fileadmin/DAM/energy/se/pp/coal/cmm/11cmm_gmi.cs_oct2016/4_GMI_Poland_coal.pdf
8. BPIE and i24c - Buildings Performance Institute Europe; Industrial Innovation for Competitiveness (2016): *Scaling up Deep Energy Renovation, Unleashing the Potential through Innovation and industrialization. Building Performance Institute of Europe and*

Industrial Innovation for Competitiveness. http://bpie.eu/publication/scaling-up-deep-energy-renovation/
9. Brunner K., Spitzerb M., Christanell A. (2012): *Experiencing fuel poverty. Coping strategies of low-income households in Vienna/Austria*. http://www.sciencedirect.com/science/article/pii/S0301421511009748

Internet-sources:

1. Electronic library system of the RUDN and third-party electronic library systems, to which university students have access on the basis of concluded contracts:
- electronic library system of the RUDN University http://lib.rudn.ru/MegaPro/Web
- electronic library system «Университетская библиотека онлайн» http://www.biblioclub.ru
- electronic library system Юрайт http://www.biblio-online.ru
- electronic library system «Консультант студента» www.studentlibrary.ru
- electronic library system «Лань» http://e.lanbook.com/
- electronic library system «Троицкий мост»

2. Databases and search engines:
- electronic fund of legal and regulatory and technical documentation http://docs.cntd.ru/
- Yandex search engine https://www.yandex.ru/
- Google search engine https://www.google.ru/
- abstract database SCOPUS http://www.elsevierscience.ru/products/scopus/

*Educational and methodological materials for independent work of students during the development of the discipline/ module *:*
1. A course of lectures on the discipline " Management of energy resources ".

* - all educational and methodological materials for independent work of students are placed in accordance with the current procedure on the discipline page in the Telecommunication educational and Information System!

8. MID-TERM ASSESSMENT AND EVALUATION TOOLKIT

Evaluation materials and a point-rating system* for assessing the level of competence formation (part of competencies) based on the results of mastering the discipline "Management of energy resources " are presented in the Appendix to this Work Program of the discipline.

* - evaluation toolkit and ranking system are formed on the basis of the requirements of the relevant local regulatory act of the RUDN (regulations / order).

DEVELOPER:

Professor-consultant of the ESandPQM Department		**Khaustov A.P.**
Position, Department	Signature	Name

HEAD OF THE DEPARTMENT:

Director of ES&PQM Department		**Savenkova E.V.**
Department	Signature	Name

HAED OF THE HIGHER EDUCATION PROGRAM:

Associate Professor of the EM Department		**Kapralova D.O.**
Position, Department	Signature	Name

Department Environmental Safety and Product Quality Management
educational department to be specified

APPROVED
Department meeting protocol No_____,
Dated _____
day, month, year
Head of Educational Department
_____(Savenkova E.V.)
signature

ASSESSMENT TOOLKIT

for the course

anagement of Environmental-economic Risks / Управление эколого-экономическими рисками

field of studies / speciality code and title

05.04.06 "Ecology and nature management"
field of studies / speciality code and title

«Integrated Solid Waste Management»

higher education programme profile/specialisation title

Master
graduate's qualification (degree)

Passport to Assessment Toolkit for Course Management of Environmental-economic Risks / Управление эколого-экономическими рисками

Field of Studies / Speciality 05.04.06 "Ecology and Nature management"/ «Integrated Solid Waste Management»
code title

Management of Environmental-economic Risks / Управление эколого-экономическими рисками

Competences (competences in part) under assessment	Course module under assessment	Course topic under assessment	Tools to assess higher education programme mastering level										Points for topic	Points for module
			Class work					Self-studies				Exam/Pass-fail assessment		
			Quiz	Test	Work with lecture materials	Work at the seminars	Practice	Report	Research essay/ Library research paper	Calculation and graphic work	Group work project			
GC-6, CPC-6, PC-3 PC-5 PC-6	Introduction	The concept of environmental risks. Enterprise risks and their assessment	1	2										
		Project risks, their minimization and the need to take into account when analyzing the sustainability of investment projects	1	2			5							

GC-6, CPC-6, PC-3 PC-5 PC-6	Risk analysis and assessment	Environmental and economic risks and methods of their analysis and assessment	1	2			5							
		Risk identification. Risk factors	1	2			5							
		Economic characteristics of environmental risks	1	2										
GC-6, CPC-6, PC-3 PC-5 PC-6	Environmental risk and environmental projects	Risks of environmental and industrial safety in investment projects	1	2			5							
		Climate risks.	1	2			5							
GC-6, CPC-6, PC-3 PC-5 PC-6	Risk management in environmental management	Management of risks. Environmental insurance	1	2			5							
		Minimizing environmental risks for sustainable operation of enterprises	1	2			5							
GC-6, CPC-6, PC-3 PC-5 PC-6	Minimizing environmental risks	Minimizing environmental risks and implementing environmental management systems	1	2										
		Total	**10**	**20**			**35**	**20**				**15**		**100**

ASSESSMENT MATERIALS FOR CURRENT CONTROL OF STUDENTS' ACHIEVEMENT AND INDEPENDENT WORK IN THE DISCIPLINE

Solving practical tasks is used to assess the quality of students' mastery of part of the educational material of the discipline and the level of development of the relevant competencies (parts of the competence). The content and form of the case report are given in the relevant Guidelines posted on the discipline page in TUIS. The contents of the report, the scale and criteria for evaluating the report (Table 2.1.) are brought to the attention of students at the beginning of each lesson. The report is assessed as "passed" or "failed". The grade is announced to the student immediately after defending the report.

Table 2.1. Scale and criteria for evaluating laboratory reports

Scale	Evaluation criteria
The grade is "passed" (all points planned for a specific laboratory work of the BRS are awarded)	- presentation of the material is logical and competent; - fluency in terminology; - the ability to express and justify your judgments when answering test questions; - ability to describe the phenomena and processes being studied; - ability to resolve specific situations (minor errors or insufficiently complete disclosure of the content of the question or unprincipled errors in answering questions are allowed).
"Failed" grade (no points awarded)	- lack of necessary theoretical knowledge; errors were made in defining concepts and describing the phenomena and processes being studied, their meaning was distorted, measurement results were not assessed correctly; - ignorance of the basic material of the curriculum, gross errors in presentation are made.

Topics of reports

1. Environmental risk from man-made accidents and disasters.
2. Man-made accidents and natural disasters.
3. Environmental insurance of hazardous production facilities.
4. International environmental risk management programs.
5. The role of the world community and individual states in assessing environmental risk.

List of practical assignment topics to be completed within the framework of mastering the discipline "Management of environmental-economic risks / Management of environmental-economic risks"

Task No. 1. Determination of environmental risk. Basic conceptual concepts and definitions. The main components of environmental risk. Rules for acceptable environmental risk
Task No. 2. Technogenic systems: definition and classification. Technical systems leading to the destruction of the natural environment.
Task No. 3. Environmental insurance Definition of the concept of environmental insurance and classification of its types. Mandatory environmental insurance.
Task No. 4. International standards for environmental risk management. Risk management model. Statement of the problem and purpose of risk management. Flowchart of the risk management model and its component blocks: danger, protection, safety

In general, a student's extracurricular independent work while studying a course includes the following types of work: – elaboration (study) of lecture materials; – reading and studying the recommended basic and additional literature; – preparation for practical classes; – search and processing of materials from Internet resources, scientific publications; – preparation for the current (test) and final (intermediate certification) control of knowledge in the discipline.

3. ASSESSMENT MATERIALS FOR INTERMEDIATE CERTIFICATION IN THE DISCIPLINE

Interim certification in the discipline "Management of environmental-economic risks" is carried out in the form of a certification test based on the results of studying the discipline/at the end of the autumn and summer semester. Types of certification test – TEST WITH ASSESSMENT (in accordance with the approved curriculum).

The certification test is carried out on tickets containing three questions on the discipline course. Based on the results of the certification test, the student can receive from 1 to 15 points.

Questions to prepare for the certification test in the discipline "Management of environmental-economic risks / Management of environmental-economic risks":

1. Components of environmental risk.
2. Environmental risk factors.
3. Environmental risk zones. Risk level.
4. Types of socio-ecological risk. Acceptable risk.
5. Rules for acceptable environmental risk.
6. Environmental risk calculations. Statistical data.
7. Characteristic risk values.
8. Risk management. Stress - indices.
9. Comparison of risks.
10. Man-made accidents caused by drought.
11. Man-made accidents due to fire.
12. Accidents in economic sectors.
13. Types of natural disasters.
14. Critical, crisis or catastrophic severity.
15. Environmental insurance.

16. Environmental risks.
17. Environmental safety.
18. Measure of environmental hazard.
19. International environmental risk management programs
20. National programs for protection from environmental hazards.
21. Environmental national laws.
22. Ecological “collapse”: concept, implementation factors.
23. Technogenic systems: definition and classification.
24. Definition of the concept of environmental insurance and classification of its types.

Table 3.1. Scale and criteria for evaluating students’ responses to the certification test

Response Evaluation Criteria	**Points**		
	The answer does not meet the criterion	**The answer partially meets the criterion**	**The answer fully meets the criterion**
The student gives an answer without leading questions from the teacher	0	1-2	3
The student practically does not use the prepared answer manuscript	0	1-2	3
The answer shows the teacher’s confident knowledge of the terminological and methodological apparatus of the discipline/module	0	1-2	3
The answer has a clear logical structure	0	1-2	3
The answer shows the student’s understanding of the connections between the subject of the question and other sections of the discipline/module and/or other disciplines/modules of the EP	0	1-2	3
ИТОГО			**15**

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