

*Federal State Autonomous Educational Institution of Higher Education*

*"Peoples' Friendship University of Russia"*

*Faculty of Ecology*

Recommended by the Methodological council  
on specialties and study directions

## WORKING PROGRAM OF THE DISCIPLINE

Name of the discipline

### **INDUSTRIAL NATURE MANAGEMENT AND ECONOMICS**

Recommended for the specialty/ direction

#### **05.04.06 Ecology and nature management**

Masters' program:

*Economics of natural resources management*

### 1. Goals and objectives of the discipline:

The purpose of the discipline is obtaining theoretical knowledge and practical competencies in the field of assessing the environmental problems of industrial nature management, choosing ways to organize environmental protection and justifying their ecological and economic efficiency.

Tasks:

- familiarization with the main sectoral problems of industrial environmental management of the main sectors of the economy;
- obtaining skills in ecological and economic assessment of environmental damage as a result of problems in the field of industrial nature management;
- obtaining skills to substantiate the ecological and economic efficiency of the choice of environmental protection measures and the best available technologies.

### 2. Place of discipline in the structure of the educational program:

The discipline **INDUSTRIAL NATURE MANAGEMENT AND ECONOMICS** refers to an optional part of block 1 of the curriculum.

Table No. 1 shows the previous and subsequent disciplines aimed at the formation of the discipline's competencies in accordance with the competence matrix of EP HE.

Table 1

#### Previous and subsequent disciplines aimed at building competencies

Nr.	Code and name of competence	Preceding disciplines	Subsequent disciplines (groups of disciplines)
Universal competencies			
1	UC-1 Willingness to act in non-standard situations, to bear social and ethical responsibility for the decisions made	-	Management of environmental-economic risks Ecologic-economical aspects of environmental projects
Professional competencies (type of professional activity - research, control and expert, organizational and management)			
3	PC-8 the ability to organize and manage research and development and expert and analytical work using advanced knowledge in the field of environmental management	-	Research work Management of environmental-economic risks Ecologic-economical aspects of environmental projects

### 3. Requirements for the results of mastering the discipline:

The process of studying the discipline is aimed at the formation of the following competencies according to the educational standard:

UC-1 Willingness to act in non-standard situations, to bear social and ethical responsibility for the decisions made

PC-8 the ability to organize and manage research and development and expert and analytical work using advanced knowledge in the field of environmental management

As a result of studying the discipline, the student must:

Know: theoretical basics in the field of assessing the environmental problems of industrial nature management, choosing ways to organize environmental protection and justifying their ecological and economic efficiency.

Be able to: to give qualitative and quantitative ecological and economic assessment of environmental damage as a result of problems in the field of industrial nature management.

Possess: skills to substantiate the ecological and economic efficiency of the choice of environmental protection measures and the best available technologies.

#### 4. The scope of the discipline and types of educational work

The total labor intensity of the discipline	2 credits								
Type of educational work	Total hours	Semesters							
		1	2	3	4	5	6	7	8
<b>Classroom Lessons (total)</b>									
<b>Including:</b>									
<i>Lectures</i>									
<i>Practical lessons</i>	16		16						
<i>Seminars</i>	-								
<i>Laboratory work</i>	-								
<i>Independent work</i>	34								
Control	2								
The total labor intensity, hours.	72								
The total labor intensity, credits	2								

#### 5. Discipline content

##### 5.1 Contents of discipline sections

Discipline section name	Section content (topics)
1. Introduction to the industrial nature management	Concept of nature management. Evolution and features of industrial nature management. Modern problems of nature management in the industrial sector of the economy. Modern tendencies
2. Sectoral problems of industrial nature management	Problems of industrial nature management in the mining industry Problems of industrial nature management in fuel and energy complex Problems of industrial nature management in the chemical industry Problems of industrial nature management in the transport industry
3. Environmental and economic consequences of sectoral problems of industrial nature management	Concept of environmental damage. Approaches to the calculation of damages in different sectors of the economy. Evaluation of natural environmental damage and its economic equivalents. Environmental damage calculation as a base for the evaluation of economic efficiency of nature protection
4. Best available technologies in the industrial nature management	Concept of BATs. Development of the system of regulation in industrial nature management. Actual European experience and national features of BAT standardization
5. Economic efficiency of environmental protection projects	Basics of economic assessment of the efficiency of environmental protection projects. Components of the environmental and economic efficiency and their calculation.

##### 5.2\* Sections of disciplines and types of classes

№ п/п	Discipline section name	Lectures	Practical lessons	Independent work	Total hours
1.	1. Introduction to the industrial nature management		2	6	8

2.	2. Sectoral problems of industrial nature management		4	6	10
3.	3. Environmental and economic consequences of sectoral problems of industrial nature management		4	6	10
4.	4. Best available technologies in the industrial nature management		4	6	10
5.	5. Economic efficiency of environmental protection projects		2	10	12

## **6. Laboratory workshop (if available) - NO**

## **7. Practical lessons; seminars**

Nr	Discipline section	Subjects of practical classes (seminars)	Total hours
1.	Introduction to the industrial nature management	Analysis of the tendencies in the elimination of the environmental problems in the sphere of nature management	1
2.	Sectoral problems of industrial nature management	Evaluation of accumulated environmental damages	2
3	Environmental and economic consequences of sectoral problems of industrial nature management	Methods for calculating of the environmental damages	2
4	Best available technologies in the industrial nature management	Justification of BATs implementation for branches of the economy	2
5	Economic efficiency of environmental protection projects	Economic assessment of the efficiency of environmental protection projects	1

## **8. Material and technical base of the discipline:**

An auditorium equipped with multimedia equipment and a personal computer with a standard package of office programs.

## **9. Information support of the discipline**

*When studying the discipline, traditional information technologies are used to present the theoretical part of the material by the teacher (PowerPoint presentation).*

a) Software

MSWindows; MSOffice

b) databases, reference and search systems

[www.mnr.gov.ru](http://www.mnr.gov.ru) - site of the Ministry of Natural Resources of the Russian Federation;

<http://rpn.gov.ru/> - Federal Service for Supervision in the Sphere of Natural Resources (Rosprirodnadzor);

[www.ecoindustry.ru](http://www.ecoindustry.ru) - site of the journal "Production Ecology";

[www.unep.org](http://www.unep.org) - site of the United Nations Environment Program;

www.wwf.ru - site of the World Wildlife Fund.

<http://burondt.ru/> - website of the BAT Bureau - information on the introduction of standardization based on the best available technologies

[http://www.mnr.gov.ru/activity/directions/zelenye\\_standarty/zelenye\\_standarty/?sphrase\\_id=124597](http://www.mnr.gov.ru/activity/directions/zelenye_standarty/zelenye_standarty/?sphrase_id=124597) - information on the development, application and implementation of "green standards"

[http://www.mnr.gov.ru/activity/directions/natsionalnyy\\_proekt\\_ekologiya/](http://www.mnr.gov.ru/activity/directions/natsionalnyy_proekt_ekologiya/) - information on the progress of the National Project "Ecology"

## 10. Literature

### Basic list

1. Bourg D., Erkman S. (ed.). Perspectives on industrial ecology. – Routledge, 2017. URL: <https://www.google.com/books?hl=ru&lr=&id=AG5QDwAAQBAJ&oi=fnd&pg=PP1&dq=industrial+ecology&ots=0k7bkqv3ym&sig=5Bba8b6qhanaTBAsvB7MtTSIIks>

2. Leikin Yu.A. "Fundamentals of environmental regulation: Textbook. M.: Publishing house "Forum", 2018

### Additional list

Bruel A. et al. Linking industrial ecology and ecological economics: A theoretical and empirical foundation for the circular economy //Journal of Industrial Ecology. – 2019. – T. 23. – №. 1. – C. 12-21. URL: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/jiec.12745>

Spencer K. et al. Integrated and sustainable management of post-industrial coasts //Frontiers in Environmental Science. – 2020. URL: <https://qmro.qmul.ac.uk/xmlui/bitstream/handle/123456789/65106/Spencer%20Integrated%20and%20Sustainable%20Management%20of%20Post-industrial%20Coasts%202020%20Accepted.pdf?sequence=2>

Sullivan K., Thomas S., Rosano M. Using industrial ecology and strategic management concepts to pursue the Sustainable Development Goals //Journal of Cleaner Production. – 2018. – T. 174. – C. 237-246. URL: <https://fardapaper.ir/mohavaha/uploads/2017/11/Using-industrial-ecology-and-strategic-management-concepts-to-pursue-the-Sustainable-Development-Goals.pdf>

Arbolino R. et al. Towards a sustainable industrial ecology: Implementation of a novel approach in the performance evaluation of Italian regions //Journal of Cleaner Production. – 2018. – T. 178. – C. 220-236. URL: [https://eprints.qut.edu.au/115357/1/JCP\\_QUT-eprints.pdf](https://eprints.qut.edu.au/115357/1/JCP_QUT-eprints.pdf)

## 11. Methodical instructions for students on mastering the discipline (module)

Independent work of students includes:

- individual study of theoretical material on the subject of the course (links to information sources are presented in the previous sections);
- study of additional material;
- preparation of abstracts on the topics specified in the program.

11.1. Independent study of additional theoretical material is carried out by students on an individual basis; the list of recommended information sources is given above.

11.2. Requirements for writing abstracts

Academic ethics, respect for copyright. In the first lesson, students are informed about the need to comply with the norms of academic ethics and copyright during their studies. In particular, information is provided:

- general information about copyright;

- citation rules;
- link formatting rules

All footnotes in the text are carefully checked and provided with “addresses”. It is not permissible to include in your work excerpts from the works of other authors without indicating this, to retell someone else's work close to the text without referring to it, to use other people's ideas without indicating the primary sources. This also applies to sources found on the Internet. You must specify the full site address. All cases of plagiarism must be excluded. If unjustified and incorrect borrowings are identified, the abstract is not accepted.

When preparing written works, the following must be submitted without fail: work plan; a list of used literature, drawn up in accordance with the current rules for the bibliographic description of used sources.

For the preparation of the abstract, only special relevant sources should be used. In addition to abstracts, the subject of which is related to the dynamics of any phenomena over many years, or the historical development of scientific views on any problem, sources should be used for a period of no more than 10 years.

The prepared essay should be presented at one of the classes in agreement with the teacher. Use of PowerPoint presentations (or those prepared using similar licensed or free software) is encouraged, but not required. The approximate time of the presentation is up to 15 minutes. The structure of the report and additional requirements for the quality of materials are determined by the chosen topic and are additionally discussed with the teacher.

**12. Fund of appraisal funds for intermediate certification of students in the discipline (module)** (developed in accordance with the requirements of the "Regulations for the formation of funds of appraisal funds", approved by order of the rector dated 05.05.2016 No. 420).

**Department of Applied Ecology**

APPROVED

at the meeting of the department

August 28, 2019, minutes No. 1

Head of the Department

\_\_\_\_\_ M.M. Redina

(подпись)

# **VALUATION FUND**

## **ON THE EDUCATIONAL DISCIPLINE**

### **INDUSTRIAL NATURE MANAGEMENT AND ECONOMICS**

direction 05.04.05 "Ecology and nature management"

Program:

*Economics of natural resources management*

Qualification (degree) of the graduate –

*Master of Ecology and Nature Management*

## Passport of the fund of assessment tools by discipline

Direction 05.04.6 «Экология и природопользование»:

Discipline: INDUSTRIAL NATURE MANAGEMENT AND ECONOMICS

Code Б1.В.07

### *12.1. Балльно-рейтинговая система оценки и характеристика шкалы оценивания*

#### *Rating assessment system and characteristics of the assessment scale*

#### *Балльно-рейтинговая система оценки и характеристика шкалы оценивания*

Controlled competence code or part thereof Код контролируемой компетенции или ее части	Controlled discipline topic Контролируемая тема дисциплины	Forms of control ФОСы (формы контроля уровня освоения ООП)					Topic points Баллы темы
		Classroom work Аудиторная работа			Самостоятельная работа	Экзамен	
		Test / Тест	Test work Контрольная работа	Class work Работа на занятии	Документ seminar report		
UC-1 PC-8	Introduction to the industrial nature management	X		10			4
UC-1 PC-8	Sectoral problems of industrial nature management	X		12			4
UC-1 PC-8	Environmental and economic consequences of sectoral problems of industrial nature management	X		12			6
UC-1 PC-8	Best available technologies in the industrial nature management	X		10			8
UC-1 PC-8	Economic efficiency of environmental protection projects	X		12			10
	<b>Exam Экзамен</b>		15	56	15	14	

**12.2** The maximum number of credits in the course is 3. At the same time, the following ratio is established between the number of points and the number of credits:

#### Points to credits ratio

Total points	Final assessment	Amount of credits
91	5	3
91-100	5	3
86 - 91	5 (B)	3
71-85	4 (C)	2
61-70	3+ (D)	1
51 - 60	3 (E)	1



21 - 51	2 (FX)	0
<21	2 (F)	0

6. Deciphering of grades is also accepted according to the specified document:
7. - A: "Excellent" - the theoretical content of the course has been fully mastered, without gaps, the necessary practical skills for working with the material learned have been formed, all the educational tasks provided for by the training program have been completed, the quality of their implementation was assessed by the number of points close to the maximum.
8. - B: "Very good" - the theoretical content of the course is mastered completely, without gaps, the necessary practical skills of working with the acquired material are basically formed, all the educational tasks provided for by the training program are completed, the quality of most of them is assessed by the number of points close to the maximum ...
9. - C: "Good" - the theoretical content of the course has been mastered completely, without gaps, some practical skills of working with the mastered material are not sufficiently formed, all the educational tasks provided for by the training program have been completed, the quality of performance of none of them has not been assessed with a minimum number of points, some types of tasks have been completed with mistakes.
10. - D: "Satisfactory" - the theoretical content of the course is partially mastered. but the gaps are not significant, the necessary practical skills to work with the acquired material are basically formed, most of the educational tasks provided for in the training program have been completed, some of the completed tasks may contain errors.
11. - E: "Mediocre" - the theoretical content of the course is partially mastered, some practical skills have not been formed, many of the educational tasks provided for by the training program have not been completed, or the quality of some of them is assessed by the number of points close to the minimum.
- FX: "Conditionally unsatisfactory" - the theoretical content of the course has been partially mastered, the necessary practical skills have not been formed, most of the educational tasks provided for by the training program have not been completed, or the quality of their implementation was assessed by the number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of completing educational tasks.
- F: "Certainly unsatisfactory" - the theoretical content of the course has not been mastered, the necessary practical skills are not formed, all the completed study tasks contain gross errors, additional independent work on the course material will not lead to any significant improvement in the quality of the study tasks.

### ***12.3 List of competencies and stages of their formation***

Nr.	Code and name of competence	Preceding disciplines	Subsequent disciplines (groups of disciplines)
<b>Universal competencies</b>			-
1	UC-1 Willingness to act in non-standard situations, to bear social and ethical responsibility for the decisions made	-	Management of environmental-economic risks Ecologic-economical aspects of environmental projects
<b>Professional competencies (type of professional activity - research, control and expert, organizational and</b>			

management)			
3	PC-8 the ability to organize and manage research and development and expert and analytical work using advanced knowledge in the field of environmental management	-	Research work Management of environmental-economic risks Ecologic-economical aspects of environmental projects

**12.4. Typical control tasks or other materials necessary to assess knowledge, skills, skills and (or) experience of activities, characterizing the stages of the formation of competencies in the process of mastering the educational program**

***Questions to prepare for certification***

1. Concept of nature management.
2. Concept of environmental crisis. Crisis in the history of humanity
3. Evolution and features of industrial nature management.
4. Modern problems of nature management in the industrial sector of the economy.
5. Modern tendencies
6. Problems of industrial nature management in the mining industry
7. Problems of industrial nature management in fuel and energy complex
8. Problems of industrial nature management in the chemical industry
9. Problems of industrial nature management in the transport industry
10. Concept of environmental damage.
11. Approaches to the calculation of damages in different sectors of the economy.
12. Evaluation of natural environmental damage and its economic equivalents.
13. Environmental damage calculation as a base for the evaluation of economic efficiency of nature protection
14. Concept of BATs.
15. Development of the system of regulation in industrial nature management.
16. Actual European experience and national features of BAT standardization
17. Basics of economic assessment of the efficiency of environmental protection projects.
18. Components of the environmental and economic efficiency and their calculation

**12.4. Methodological materials defining the procedures for assessing knowledge, skills, and activity skills, characterizing the stages of the formation of competencies).**

The assessment of knowledge, skills and abilities is carried out using the components of the WCF presented in paragraphs. 12.1-12.34, in accordance with the sequence of acquisition of competencies indicated in table. p. 12.2.

The program is compiled in accordance with the requirements of the ES HE RUDN / FGOS HE.

**Developers:**

Professor of the Department of Applied Ecology

**Khaustov A.P.**

ПОДПИСЬ

**Head of the Department  
applied ecology**

**M.M. Redina**

название кафедры

ПОДПИСЬ

инициаль> фамилия