

**Federal State Autonomous Educational Institution of Higher Education  
"Peoples' Friendship University of Russia"**

**Institute of Environmental Engineering**

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

**COURSE SYLLABUS**

**METHODOLOGY OF SCIENTIFIC CREATION**

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(наименование дисциплины/модуля)

**Recommended by the Methodological Council for the Education Field:**

**05.04.06 Ecology and nature management**

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(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**

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(наименование (профиль/специализация) ОП ВО)

## 1. COURSE GOALS

The course goal is to acquire theoretical knowledge and practical skills of assessment and planning in the field of environmental management.

The main sections of the course:

- Introduction to environmental management;
- Assessment of the resource base of nature management;
- State management of natural resources;
- "Green economy" and tools for its regulation;
- Environmental management at enterprises;
- Integrated management systems at enterprises.

## 2. LEARNING OUTCOMES

The mastering of the discipline " Methodology of scientific creation" 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)
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	<b>GPC -1.1</b> Knows the philosophical concepts of natural science and the methodology of scientific knowledge,
		<b>GPC -1.2</b> Able to use in-depth knowledge of the philosophical concepts of natural science in assessing the consequences of their professional activities
		<b>GPC -1.3</b> 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, geocology and nature management in solving research and applied problems of professional activity.	<b>GPC -2.1</b> Knows the basics of ecology, geocology, environmental economics and circular economy, as well as environmental management
		<b>GPC -2.2</b> Able to use environmental, economic and other special knowledge and algorithms to solve professional problems
		<b>GPC -2.3</b> Able to find, analyze and competently use the latest information and modern techniques in the performance of research and applied tasks
SPC-2	Able to develop standard environmental measures and assess the impact of planned facilities or other forms of economic activity on the environment	<b>SPC-2.1</b> Ability to creatively use knowledge of fundamental and applied sections of special disciplines in production and technological activities
		<b>SPC-2.2</b> Able to organize research in applied areas of environmental protection and interpret the results obtained

### 3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline " Methodology of scientific creation" refers to Compulsory Disciplines of the Higher Education Program.

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 " Methodology of scientific creation".

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

<b>Code</b>	<b>Competence</b>	<b>Previous Disciplines (Modules)</b>	<b>Subsequent Disciplines (Modules)</b>
<b>GPC -1</b>	Able to use philosophical concepts and methodology of scientific knowledge in the study of various levels of organization of matter, space and time		Учебная практика / Educational practice Производственная практика / Production practice Научно-исследовательская работа / Research work НИР / Research work Преддипломная практика / Pre-graduate practice Защита ВКР / Protection of the final qualifying work
<b>GPC -2</b>	Able to use special and new sections of ecology, geocology and nature management in solving research and applied problems of professional activity	Estimations of natural resources / Оценки природных ресурсов	Methodology of scientific creation / Методология научного творчества Modern technologies for nature protection / Современные технологии защиты окружающей среды Environmental standards and nature management / Экологические стандарты и природопользование Modern remediation technologies / Современные технологии ремедиации Economic aspects of natural resources management / Экономические аспекты природопользования Management of water resources / Управление водными ресурсами Environmental-economic aspects of environmental projects / Эколого-экономические аспекты экологических проектов Environmental norms for sustainability / Экологические нормы для устойчивого развития History and methology of ecology and natural resources management /

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
			История и методология экологии и природопользования International collaboration / Международное сотрудничество Engineering ecology / Инженерная экология Monitoring of environmental impacts / Мониторинг экологических воздействий Industrial safety / Промышленная безопасность Simulation and prevention of accidents / Моделирование и предупреждение аварий Учебная практика / Educational practice Производственная практика / Production practice Научно-исследовательская работа / Research work НИР / Research work Преддипломная практика / Pre-graduate practice
SPC -2	Able to develop standard environmental measures and assess the impact of planned facilities or other forms of economic activity on the environment		Modern technologies for nature protection / Современные технологии защиты окружающей среды Engineering ecology / Инженерная экология Monitoring of environmental impacts / Мониторинг экологических воздействий Учебная практика / Educational practice Производственная практика / Production practice Научно-исследовательская работа / Research work НИР / Research work Преддипломная практика / Pre-graduate practice

#### 4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

Workload of the course « Methodology of scientific creation» 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
<i>Contact academic hours</i>	34				
Incl.:					
Lectures	17	17			
Lab work					
Seminars	17	17			
<i>Self-study</i>	22	22			
<i>Evaluation and assessment</i>	16	16			
<b>Total workload</b>	Ac.hours	<b>72</b>	<b>72</b>		
	ECTS	<b>2</b>	<b>2</b>		

## 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*
Concept of science	Concept of Science. 1.2. The big fields of the Science. 1.3. Divisions and branches of the sciences. 1.4 Basic Sciences. 1.5 Applied Sciences	Lectures, Seminars
Development of the Science across the time	2.1. Historical - scientific frame. 2.2. The Genesis of the scientific thought. 2.3. Types prescientific of knowledge. 2.4. Rational speculation and origin of the natural science	Lectures, Seminars
The scientific method	3.1. Methods of the Science: analysis and synthesis, induction and deduction. 3.2. Characteristics and limitations of the scientific method. 3.3. Formal systems, models and interdisciplinary knowledge	Lectures, Seminars
Information	4.1. Quality & quantity features, 4.2. Classification of information. 4.3. Categories of articles in scientific journals. 4.4. Bradford's law. 4.5. Duplication of researches. 4.6. Subsequent steps of a literature search. 4.7. Key Words. 4.8. Relevant and pertinent documents. 4.9. Types of search with searching machines	Lectures, Seminars
Introduction to the research; Variables	5.1. Independent, dependent & confounding variables. 5.2. Choosing the Measurement. 5.3. Types of validity. 5.4. Reliability. 5.5. Sampling Groups to Study	Lectures, Seminars
Creating the Design of research	6.1. Qualitative versus Quantitative. 6.2. Empirical methods 6.3. Observation. 6.4. Experiment	Lectures, Seminars
The observation as a source of the science	7.1. The observation and the empirical science. 7.2. Features of scientific observation. 7.3. Intersubjectivity and objectivity. 7.4. Can an	Lectures, Seminars

	Observation Be Wrong? 7.5. Repeatability. 7.6. Types of observations. 7.7. Design a system for data collection. 7.8. Disadvantages of observation	
Diffusion of reports and works of research	8.1. Scientific spreading (divulgarion) and specialized means. 8.2. Criteria of choice of the way of diffusion. 8.3. Scientific magazines. 8.4. Quality indicators. 8.5. Advance of a publication of research in poster	Lectures, Seminars
Experiments	Typical Designs and Features in Experimental Design. 9.2. Central Tendency and Normal Distribution. 9.3. Calculating Experimental Errors. 9.4. Probability and Statistics. 9.5. Mean and Standard Deviation. 9.6. Reporting the Results of an Experimental Measurement. 9.5. Current contents and limitations	Lectures, Seminars
Research, development and scientific innovation	10.1. Concept. 10.2. Big inventions and inventors. 10.3. Development. 10.4. Innovation. 10.5. Patents. 10.6. Economic aspects	Lectures, Seminars
Social responsibility of the scientist	11.1. Responsibility in the application of the scientific method. 11.2. Scientific fraud. 11.3. The scientist likeconductive force of the progress of the knowledge	Lectures, Seminars
Studies of postdegree and centers of research	12.1. Project curricular. 12.2. Studies of degree. 12.3. Postdegree. 12.4. Doctorate. 12.5. National andInternational Centers of Research	Lectures, Seminars

## 6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

*Table 6.1. Classroom equipment and technology support requirements*

<b>Classroom for Academic Activity Type</b>	<b>CLASSROOM EQUIPMENT</b>	<b>Specialized learning, laboratory equipment, software and materials for the mastering the course</b>
Lecture	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.	-
Seminars	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, Stable wireless Internet connection. Software: Microsoft Windows, MS Office / Office 365, MS Teams, Chrome (latest stable release), Skype	-
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	-

<b>Classroom for Academic Activity Type</b>	<b>CLASSROOM EQUIPMENT</b>	<b>Specialized learning, laboratory equipment, software and materials for the mastering the course</b>
	educational environment.	

## 7. RECOMMENDED SOURCES FOR COURSE STUDIES

- *Main reading:*

1. Smith K. K. Exploring Environmental Ethics. – Springer International Publishing, 2018.
2. Pecorari D., Sutherland-Smith W. Perspectives on Positive Academic Ethics: an Introduction //Journal of Academic Ethics. – 2021. – Т. 19. – №. 3. – С. 305-308.
3. Düwell M., Bos G., van Steenberg N. Towards the ethics of a green future. – Taylor & Francis, 2018.

- *Additional sources:*

Englehardt E. E., Pritchard M. S. (ed.). Ethics Across the Curriculum-Pedagogical Perspectives. – New York : Springer, 2018.

Ozolinčiūtė E., Bjelobaba S., Umbrasaitė J. GUIDELINES ON THE TRANSITION FROM ACADEMIC INTEGRITY TO ETHICS IN CITIZEN SCIENCE //Concurrent Sessions 12. – С. 167.

Farasatkhah M. Academic Ethics: Moral Luck of University Students in Iran //Journal homepage: www. ijethics. com. – 2019. – Т. 1. – №. 1.

Muralidhar K., Ghosh A., Singhvi A. K. Ethics in science education, research and governance. – Indian National Science Academy, 2021.

- *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](http://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 " Methodology of scientific creation".

\* - 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 " Methodology of scientific creation" 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:**

Docent of the Rational Nature  
Management Department

Position, Department



Signature

**Kapralova D.O.**

Name

### **HEAD OF THE DEPARTMENT:**

Head of the Department of  
Environmental Safety and  
Product Quality Management

Department



Signature

**Savenkova E.V.**

Name

### **HAED OF THE HIGHER EDUCATION PROGRAM:**

Professor of the Department of  
Environmental Safety and  
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Signature

**Redina M.M.**

Name