PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE LUMUMBA

Institute of Environmental Engineering

educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

METHODOLOGY OF SCIENTIFIC CREATION

(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:

УПРАВЛЕНИЕ ПРИРОДОПОЛЬЗОВАНИЕМ / NATURE MANAGEMENT

(наименование (профиль/специализация) ОП ВО)

2023

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)
УК-1. **GC-1.**	Способен осуществлять критический анализ проблемных ситуаций на основе системного подхода, вырабатывать стратегию действий/ Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy	**УК-1.1** умеет анализировать проблемную ситуацию как систему, выявляя ее составляющие и связи между ними **GC-1.1** is able to analyze a problem situation as a system, identifying its components and relationships between them
		УК-1.2 владеет аргументацией и разрабатывает содержательно стратегию решения проблемной ситуации на основе системного и междисциплинарного подходов **GC-1.2** owns argumentation and develops a meaningful strategy for solving a problem situation based on a systematic and interdisciplinary approach
		УК-1.3 знает основы стратегии и определяет возможные риски, предлагая пути их устранения **GC-1.3** knows the basics of the strategy and identifies possible risks, suggesting ways to eliminate them
УК-3. **GC-3**	Способен организовывать и руководить работой команды, вырабатывая командную стратегию для достижения поставленной цели. Able to organize and manage the work of the team, developing a team strategy to achieve the goal	**УК -3.1** владеет приемами и методами командной работы, организует отбор членов команды для достижения поставленной цели **GC-3.1** owns the techniques and methods of teamwork, organizes the selection of team members to achieve the goal
		УК -3.2 способен организовать и корректировать работу команды, в том числе на основе коллегиальных решений **GC-3.2** able to organize and adjust the work of the team, including on the basis of collegial decisions

УК-4. **GC-4**	Способен применять современные коммуникативные технологии, в том числе на иностранном(ых) языке(ах) для академического и профессионального взаимодействия Able to apply modern communication technologies, including in a foreign language(s) for academic and professional interaction	**УК -4.1** умеет устанавливать контакты и организовывать общение в соответствии с потребностями совместной деятельности, используя современные коммуникационные технологии **GC-4.1** is able to establish contacts and organize communication in accordance with the needs of joint activities, using modern communication technologies
		УК -4.2 знает основы деловой документации и использует профессиональную лексику на иностранном и русском языках **GC-4.2** knows the basics of business documentation and uses professional vocabulary in foreign and Russian languages
		УК-4.3 способен организовать обсуждение результатов и представлять результаты исследовательской и проектной деятельности на различных публичных мероприятиях на русском или иностранном языке, выбирая наиболее подходящий формат. **GC-4.3** is able to organize a discussion of the 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
		УК-4.4 Представляет результаты исследовательской и проектной деятельности на различных публичных мероприятиях, участвует в академических и профессиональных дискуссиях на русском (иностранном) языке **GK-4.4** Presents the results of research and project activities at various public events, participates in academic and professional discussions in Russian (foreign) language
УК-5. **GC-5**	Способен анализировать и учитывать разнообразие культур в процессе межкультурного взаимодействия. Able to analyze and take into account the diversity of cultures in the process of intercultural interaction	**УК-5.1.** знает основные категории философии, законы исторического развития, основы межкультурной коммуникации **GC-5.1** knows the main categories of philosophy, the laws of historical development, the basics of intercultural communication
УК-6. **GC-6.**	Способен определить и реализовать приоритеты собственной деятельности и способы ее совершенствования на основе самооценки.	**УК-6.1** умеет оценивать свои ресурсы и их пределы (личностные, ситуативные, временные), целесообразно их использует **GC-6.1** knows how to evaluate his resources and their limits (personal, situational, temporary), uses them appropriately
		УК-6.2 способен определять образовательные потребности и способы совершенствования

	Able to identify and implement the priorities of their own activities and ways to improve it based on self-assessment	собственной (в том числе профессиональной) деятельности на основе самооценки **GC-6.2** is able to determine educational needs and ways to improve their own (including professional) activities based on self-assessment
		УК-6.3 владеет навыками выстраивания гибкой профессиональной траектории с учетом накопленного опыта профессиональной деятельности, динамично изменяющихся требований рынка труда и стратегии личного развития **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 strategies
УК-7. **GC-7**	Способен к использованию цифровых технологий и методов поиска, обработки, анализа, хранения и представления информации (в области Экологии и природопользования) в условиях цифровой экономики и современной корпоративной информационной культуры. Able to use digital technologies and methods of searching, processing, analyzing, storing and presenting information (in the field of Ecology and nature management) in the digital economy and modern corporate information culture	**УК-7.1** владеет навыками использования цифровых технологий и методов поиска, **GC-7.1** has the skills to use digital technologies and search methods
		УК-7.2 умеет обрабатывать, анализировать, хранить и правильно представлять информацию **GC-7.2** is able to process, analyze, store and correctly present information
GPC -1	**ОПК-1.** Способен использовать философские концепции и методологию научного познания при изучении различных уровней организации материи, пространства и времени. **GPC-1** Able to use philosophical concepts and methodology of scientific cognition in the study of various levels of organization of matter, space and time	**ОПК-1.1** Знает философские концепции естествознания и методологию научного познания **GPC-1.1** Knows philosophical concepts of natural science and methodology of scientific cognition,
		ОПК-1.3 Способен применять полученные знания в своей научно-исследовательской деятельности, делать правильные обобщения и выводы **GPC-1.3** He is able to apply the acquired knowledge in his research activities, make correct generalizations and conclusions
GPC -6	Able to use special and new sections of ecology, geoecology and nature management in	**ОПК-6.1** Умеет получать, анализировать, обобщать необходимую научную информацию, используя современные методы исследований,

	solving research and applied problems of professional activity.	представлять собственные результаты в виде научных статей и публичных выступлений **GPC-6.1** He is able to receive, analyze, summarize the necessary scientific information using modern research methods, present his own results in the form of scientific articles and public speeches
		ОПК-6.2 Владеет навыками устного доклада и презентации результатов проектной и научной деятельности, свободного владения материалом **GPC-6.2** Has the skills of oral presentation and presentation of the results of project and scientific activities, fluency in the material
		ОПК-6.3 Знает методические основы проведения научных исследований, требования авторского права и научной этики **GPC-6** Knows the methodological foundations of scientific research, the requirements of copyright and scientific ethics
ПК-1 **SPC-1**	**ПК-1** Способность формулировать проблемы, задачи и методы научного исследования, обобщать полученные результаты, формулировать выводы и практические рекомендации на основе результатов исследований **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	**ПК-1.1** Знает основы методологии планирования исследований **SPC-1.1** Knows the basics of research planning methodology
		ПК-1.2 Умеет обобщать полученные результаты, формулировать выводы и практические рекомендации на основе результатов исследований **SPC-1.2** He is able to summarize the results obtained, formulate conclusions and practical recommendations based on the results of research

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

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
УК-1. **GC-1.**	Способен осуществлять критический анализ		Научно-исследовательская работа в семестре, включая

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
	проблемных ситуаций на основе системного подхода, вырабатывать стратегию действий/ Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy		курсовые работы / Research work in the semester, including term papers Производственная практика / Production practice
УК-3. **GC-3**	Способен организовывать и руководить работой команды, вырабатывая командную стратегию для достижения поставленной цели. Able to organize and manage the work of the team, developing a team strategy to achieve the goal		
УК-4. **GC-4**	Способен применять современные коммуникативные технологии, в том числе на иностранном(ых) языке(ах) для академического и профессионального взаимодействия Able to apply modern communication technologies, including in a foreign language(s) for academic and professional interaction	Иностранный язык / Foreign languige	Иностранный язык / Foreign languige
УК-5. **GC-5**	Способен анализировать и учитывать разнообразие культур в процессе межкультурного взаимодействия. Able to analyze and take into account the diversity of cultures in the process of intercultural interaction	Философские проблемы естествознания / Philosophical problems of nature science Современные проблемы экологии и природопользования / Modern probems of ecology and nature manegement	

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
		Международное сотрудничество в области охраны окружающей среды / International collaboration in invironmental protection Устойчивое развитие / Sustainable development	
УК-6. **GC-6.**	Способен определить и реализовать приоритеты собственной деятельности и способы ее совершенствования на основе самооценки. Able to identify and implement the priorities of their own activities and ways to improve it based on self-assessment	Философские проблемы естествознания / Philosophical problems of nature science	Производственная практика / Production practice
УК-7. **GC-7**	Способен к использованию цифровых технологий и методов поиска, обработки, анализа, хранения и представления информации (в области Экологии и природопользования) в условиях цифровой экономики и современной корпоративной информационной культуры. Able to use digital technologies and methods of searching, processing, analyzing, storing and presenting information (in the field of Ecology and nature management) in the digital economy	Компьютерные технологии и статистические методы в экологии и природопользовании / IT in ecology and nature management	Научно-исследовательская работа в семестре, включая курсовые работы / Research work in the semester, including term papers Производственная практика / Production practice

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
	and modern corporate information culture		
GPC -1	**ОПК-1.** Способен использовать философские концепции и методологию научного познания при изучении различных уровней организации материи, пространства и времени. **GPC-1** Able to use philosophical concepts and methodology of scientific cognition in the study of various levels of organization of matter, space and time	Философские проблемы естествознания / Philosophical problems of nature science	
GPC -6	Able to use special and new sections of ecology, geoecology and nature management in solving research and applied problems of professional activity.		Научно-исследовательская работа в семестре, включая курсовые работы / Research work in the semester, including term papers Производственная практика / Production practice
ПК-1 SPC-1	Способность формулировать проблемы, задачи и методы научного исследования, обобщать полученные результаты, формулировать выводы и практические рекомендации на основе результатов исследований The ability to formulate problems, tasks and methods of scientific research, summarize the results obtained, formulate conclusions and practical recommendations based on research results		HSE менеджмент / HSE-management Экологическое проектирование промышленных объектов / Environmental design of industrial facilities Современные методы и технологии защиты окружающей среды / Modern methods and technologies of environmental protection Комплексная оценка природных и производственных потенциалов территорий / Comprehensive assessment of natural and industrial potentials of territories Информационные технологии в природопользовании /

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
			Information technologies in nature management Научно-исследовательская работа в семестре, включая курсовые работы / Research work in the semester, including term papers Производственная практика / Production 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
Contact academic hours		*34*		*34*		
Incl.:						
Lectures						
Lab work						
Seminars		34		34		
Self-study		*22*		*22*		
Evaluation and assessment		*16*		*16*		
Total workload	Ac.hours	**72**		**72**		
	ECTS	**2**		**2**		

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 Observation Be Wrong? 7.5. Repeatability. 7.6. Types of observations. 7.7. Design a system for data collection. 7.8. Disadvantages of observation	Lectures, Seminars
Diffusion of reports and works of research	8.1. Scientific spreading (divulgation) 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

Classroom for Academic Activity Type	CLASSROOM EQUIPMENT	Specialized learning, laboratory equipment, software and materials for the mastering the course
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 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 Steenbergen 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
- 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		**Kapralova D.O.**
Position, Department	Signature	Name

HEAD OF THE DEPARTMENT:

Head of the Department of Environmental Safety and Product Quality Management		**Savenkova E.V.**
Department	Signature	Name

HAED OF THE HIGHER EDUCATION PROGRAM:

Professor of the Department of Environmental Safety and Product Quality Management		**Redina M.M.**
Position, Department	Signature	Name