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

Institute of Environmental Engineering
(наименование основного учебного подразделения (ОУП)-разработчика ОП ВО)

COURSE SYLLABUS

Радиоэкологическая безопасность территорий / Radioecological safety of territories
(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)

2022

1. COURSE GOALS

The course goal is to develop competences in evaluation and prevention riscsin sphere of radioecological safety.

2. LEARNING OUTCOMES

The mastering of the discipline " Радиоэкологическая безопасность территорий / Radioecological safety of territories" 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)
SPC-2	Способность творчески использовать в производственно-технологической деятельности знания фундаментальных и прикладных разделов специальных дисциплин The ability to creatively use knowledge of fundamental and applied sections of special disciplines in production and technological activities	**ПК-2.1** Владеет навыками применения передовых достижений науки для выбора и внедрения наилучших доступных технологий (НДТ) **SPC-2.1** Has the skills of applying advanced scientific achievements to select and implement the best available technologies (BAT)
SPC-5	Способен разрабатывать типовые природоохранные мероприятия и проводить оценку воздействия планируемых сооружений или иных форм хозяйственной деятельности на окружающую среду Is able to develop standard environmental protection measures and assess the impact of planned structures or other forms of economic activity on the environment	**ПК-5.1** Способен разрабатывать и планировать внедрение типовых природоохранных мероприятий с учетом международной практики и требований национального законодательства **SPC-5.1** Is able to develop and plan the implementation of standard environmental measures taking into account international practice and the requirements of national legislation

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline " Радиоэкологическая безопасность территорий / Radioecological safety of territories" 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 "Радиоэкологическая безопасность территорий / Radioecological safety of territories".

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

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
SPC-2	Способность творчески использовать в производственно-технологической деятельности знания фундаментальных и прикладных разделов специальных дисциплин The ability to creatively use knowledge of fundamental and applied sections of special disciplines in production and technological activities	Сертификация сырья, производственных процессов и продукции по международным экологическим требованиям / Certification of raw materials, production processes and products in accordance with international environmental requirements Экологическое проектирование промышленных объектов / Environmental design of industrial facilities Комплексная оценка природных и производственных потенциалов территорий / Comprehensive assessment of natural and industrial potentials of territories Хранение, переработка и утилизация отходов / Storage, processing and disposal of waste Экология и здоровье населения / Ecology and public health Геохимические методы оценки окружающей среды / Geochemical methods of environmental assessment Ландшафтное планирование / Landscape planning Управление минерально-сырьевым комплексом / Management of the mineral resource complex	Pre-graduate practice
SPC-5	Способен разрабатывать типовые природоохранные мероприятия и проводить оценку воздействия планируемых сооружений или иных форм хозяйственной	Сертификация сырья, производственных процессов и продукции по международным экологическим требованиям / Certification of raw materials, production processes and products in accordance with	Pre-graduate practice

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
	деятельности на окружающую среду Is able to develop standard environmental protection measures and assess the impact of planned structures or other forms of economic activity on the environment	international environmental requirements 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 Хранение, переработка и утилизация отходов / Storage, processing and disposal of waste Международные стандарты управления качеством окружающей среды / International Environmental Quality Management Standards Управление минерально-сырьевым комплексом / Management of the mineral resource complex	

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

Workload of the course «Радиоэкологическая безопасность территорий / Radioecological safety of territories» 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		*55*			*55*	
Evaluation and assessment		*19*			*19*	
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*
Priority tasks in the field of radiation protection of the population	Priority tasks in the field of radiation protection of the population. Control of the content of natural radionuclides and radioactive contamination by technogenic radionuclides of objects of the natural environment, products and materials.	Lectures, Seminars
Radiation safety standards	The radiation safety standards NRB 99/2010 as a fundamental regulatory document for certification of objects, products and materials on the basis of radiation	Lectures, Seminars
Regulatory documents regulating the content of technogenic radionuclides	Regulatory documents regulating the content of technogenic radionuclides (TRN) 137Cs and 90Sr in food products. Determination of the specific activity of radionuclides in food products using the alpha-, gamma-, beta-spectrometric complex "Progress". Preparation of counting samples. Device and software of the Progress spectrometric complex. Sampling of food products. Documents issued during the certification of food products on the basis of radiation. Monitoring of the content of radionuclides in drinking water.	Lectures, Seminars
Radiation control of materials	Regulatory documents regulating the content of technogenic radionuclides (TRN) 137Cs and 90Sr in wood raw materials and wood products. Sampling of wood raw materials. Sample preparation. Documentation. Radiation monitoring of scrap metal. Regulatory documents regulating the content of natural radionuclides (EN) 226Ra, 232Th and 40K in building materials. Determination of the specific activity of radionuclides using the Progress spectrometric complex. Sampling of building materials. Sample preparation. Documents issued during the certification of building materials on the basis of radiation	Lectures, Seminars
Conducting radiation-hygienic examination of	Regulations governing the conduct of radiation-hygienic examination of residential and public buildings. The	Lectures, Seminars

residential and public buildings	procedure for measuring the power of the equivalent radiation dose and the volumetric activity of radon isotopes in the air in residential and public buildings. Anti-tornado protection of residential and public buildings.	
Permissible levels of ionizing radiation and radon in construction sites	Regulatory documents regulating the permissible levels of ionizing radiation and radon in construction sites. The procedure for carrying out work on measuring the power of the equivalent radiation dose on building sites. The procedure for sampling air and carrying out work on measuring the density of radon flux from the ground surface on building sites. Methods for measuring the radon flux density from the ground surface. Documents issued during the survey of building sites on the basis of radiation.	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),	-

Classroom for Academic Activity Type	CLASSROOM EQUIPMENT	Specialized learning, laboratory equipment, software and materials for the mastering the course
	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. Khaustov A. P., Redina M. M. Environmental standards and norms. – 2020. URL: https://izd-mn.com/PDF/47MNNPU20.pdf

2. Schofield, Paul N., et al. "Data and Biomaterial Archives in Radioecology and Radiobiology; the Importance of STOREing." Biomarkers of Radiation in the Environment. Springer, Dordrecht, 2022. 53-65.

Additional sources:

1. Schultz, Vincent, and Alfred W. Klement, eds. Radioecology. Reinhold, 1963.

2. Whicker, F. Ward, and Vincent Schultz. Radioecology: nuclear energy and the environment. Vol. 1. Boca Raton, FL: CRC press, 1982.

3. Pentreath, R. J. "Radioecology, radiobiology, and radiological protection: frameworks and fractures." Journal of Environmental Radioactivity 100.12 (2009): 1019-1026.

4. Whicker, F. Ward, and Vincent Schultz. Radioecology: nuclear energy and the environment. Vol. 1. Boca Raton, FL: CRC press, 1982.

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 " Радиоэкологическая безопасность территорий / Radioecological safety of territories ".

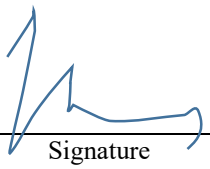
* - all educational and methodological materials for independent work of students are placed in accordance with the current procedure on the discipline page in the Telecommunication educational and Information System!

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 " Радиоэкологическая безопасность территорий / Radioecological safety of territories " 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 of the Department of Environmental Safety and Product Quality Management		**Kulieva G.A.**
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