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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
RUDN University**

Agrarian and Technological Institute

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

COURSE SYLLABUS

Veterinary radiobiology

course title

Recommended by the Didactic Council for the Education Field of:

36.05.01 Veterinary

field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:

36.05.01 Veterinary

higher education programme profile/specialisation title

1. GOALS AND OBJECTIVES OF THE COURSE

The aim of mastering the course " **Veterinary radiobiology** " is formation of fundamental and professional knowledge of the general patterns and manifestations of the biological response of the animal body to ionizing effects, which forms the scientific basis for the hygienic regulation of the radiation factor, and allows you to develop ways and methods of controlling the body's radiation reactions.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The implementation of the course "**Veterinary radiobiology**" is aimed at creating the following competencies (parts of competencies) for students:

Table 2.1. List of competencies formed by students during the development of the course (results of the development of the course)

Competence code	Competence descriptor	Indicators of competence accomplishment (within the course)
GC-8	Is able to create and maintain safe living conditions in everyday life and professional activities to preserve the natural environment, ensure the sustainable development of society, including the threat and emergence of emergencies and military conflicts	GC-8.1 Analyzes factors of harmful influence on the life activity of elements of the environment (technical means, technological processes, materials, buildings and constructions, natural and social phenomena);
		GC-8.2 Identifies hazardous and harmful factors within the scope of the job;
		GC-8.3 Identifies and corrects problems related to safety violations in the workplace;

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course "**Veterinary radiobiology**" refers to the mandatory part of block B1 of the Educational Program of Higher Education.

As part of the Educational Program of Higher Education, students also master other courses and /or practices that contribute to achieving the planned results of mastering the course "**Veterinary radiobiology**".

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

Competence code	Competence descriptor	Previous courses/modules, internships*	Subsequent courses/modules, internships*

GC-8	Is able to create and maintain safe living conditions in everyday life and professional activities to preserve the natural environment, ensure the sustainable development of society, including the threat and emergence of emergencies and military conflicts	Basics of Professional Ethics Inorganic and analytical chemistry Organic chemistry Biological physics Life safety Veterinary Microbiology and Mycology Virology and biotechnology	General and Veterinary Ecology Study practice Preparation for and passing the state exam
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4. COURSE WORKLOAD AND TRAINING ACTIVITIES

Course workload of the course "**Veterinary radiobiology**" is 3 credits.

*Table 4.1. Types of academic activities during the period of the HE program mastering for **full-time** study*

Types of academic activities		HOURS	Semesters			
			5	-	-	-
Contact academic hours		68	68	-	-	-
including						
Lectures		17	17	-	-	-
Lab work		51	51	-	-	-
Seminars (workshops/tutorials)		-	-	-	-	-
Self-study		20	20	-	-	-
Evaluation and assessment (exam/pass/fail grading)		20	20	-	-	-
Course workload	Academic hour	108	108	-	-	-
	Credit unit	3	3	-	-	-

5. COURSE CONTENTS

Table 5.1 Content of the course (module) by type of academic work

Modules	Content of the modules (topics)	Types of academic activities
Module 1. Physical bases of the action of ionizing radiation. Control methods and devices.	Topic 1.1 Physical bases of the action of ionizing radiation. Control methods and devices.	Lectures, Lab work.
Module 2. Biological effects of ionizing radiation and safety	Topic 2.1. Biological effects of ionizing radiation and safety precautions when working in radiation-contaminated areas	Lectures, Lab work.

precautions when working in radiation-contaminated areas		
Module 3. Target theory. Free radical theory	Topic 3.1. Target theory. Free radical theory	Lectures, Lab work.
Module 4. Damage repair. Somatic and inherited mutations	Topic 4.1. Damage repair. Somatic and inherited mutations	Lectures, Lab work.
Module 5. Features of the territory pollution with long-lived radioactive substances	Topic 5.1. Features of the territory pollution with long-lived radioactive substances	Lectures, Lab work.
Module 6. Transition of radionuclides into livestock products. Excretion from the body	Topic 6.1. Transition of radionuclides into livestock products. Excretion from the body	Lectures, Lab work.
Module 7. Standards for the content of radionuclides in agricultural facilities.	Topic 7.1. Standards for the content of radionuclides in agricultural facilities.	Lectures, Lab work.
Module 8. Calculation of doses of external and internal human exposure.	Topic 8.1. Calculation of doses of external and internal human exposure.	Lectures, Lab work.
Module 9. Radiation sickness of animals: acute and chronic.	Topic 9.1. Radiation sickness of animals: acute and chronic	Lectures, Lab work.
Module 10. The effect of ionizing radiation on the embryo and fetus	Topic 10.1. The effect of ionizing radiation on the embryo and fetus	Lectures, Lab work.
Module 11. Long-term effects of radiation. Genetic. action of ionizer. radiation.	Topic 11.1. Long-term effects of radiation. Genetic. action of ionizer. radiation.	Lectures, Lab work.
Module 12. Lack of modern knowledge about the effect of small doses	Topic 12.1. Lack of modern knowledge about the effect of small doses	Lectures, Lab work.
Module 13. Features of the action of ionizing radiation in small doses	Topic 13.1. Features of the action of ionizing radiation in small doses	Lectures, Lab work.
Module 14. Adaptive response. The answer of the "Witness".	Topic 14.1. Adaptive response. The answer of the "Witness".	Lectures, Lab work.
Module 15. Genome instability	Topic 15.1. Genome instability	Lectures, Lab work.

Module 16. Damage repair. Somatic and inherited mutations	Topic 16.1. Damage repair. Somatic and inherited mutations	Lectures, Lab work.
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6. COURSE EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Material and technical support of the course

<i>Classroom for Academic Activity Type</i>	<i>Equipping the classroom</i>	Specialized educational/laboratory equipment, software and materials for the development of the course (if necessary)
Lecture	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.	-
Laboratory	An auditorium for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment.	-
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. Radiobiology: textbook / N.P. Lysenko, V.V. Pak. Pak, L.V. Rogozhina, Z.G. Kusurova; Ed. by N.P. Lysenko and V.V. Pak. Pak. - 4th ed. - SPb. : Lan Publishing House, 2017. - 572 c. - (Textbooks for universities. Special literature). - ISBN 978-5-8114-1330-0.
2. Radiation hygiene: textbook / L.A. Ilyin, I.P. Korenkov, B.Y. Narkevich. - 5-th edition, revised and updated - Moscow : GEOTAR-Media, 2017. - 416 c. - ISBN 978-5-9704-4111-4.

Additional Reading:

1. Veterinary radiobiology: textbook / V.G. Plyushchikov, O.G. Semenov. - Electronic text data. - M. : RUDN, 2016. - 292 c. : ill. - ISBN 978-5-209-06898-3
2. Tests in radiobiology: tutorial / E.I. Troshin, Y.G. Vasiliev, I.S. Ivanov. - SPb. : Lan' Publisher, 2014. - 240 c. - (Textbooks for Universities. Special literature). - ISBN 978-5-8114-1685-1.

Resources of the Internet information and telecommunication network:

1. Electronic library system of RUDN and third-party Electronic library systems to which university students have access on the basis of concluded contracts:

- Electronic library system of RUDN - ELS RUDN <http://lib.rudn.ru/MegaPro/Web>
- ELS "University Library online" <http://www.biblioclub.ru>
- ELS Yurayt <http://www.biblio-online.ru>
- ELS "Student Consultant" www.studentlibrary.ru
- ELS "Lan" <http://eZlanbook.com/>
- ELS "Trinity Bridge" <http://www.trmost.com/>

2. Databases and search engines:

- electronic fund of legal and regulatory and technical documentation <http://docs.cntd.ru/>
- search engine Yandex <https://www.yandex.ru/>
- search engine Google <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 course/ module*:

1. A course of lectures on the course "**Veterinary radiobiology**".
2. Laboratory workshop on the course "**Veterinary radiobiology**".

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

8. MID-TERM ASSESSMENT

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

* - Assessment Materials and a Point Rating System are formed based on the requirements of the relevant local regulatory act of the RUDN.

DEVELOPER:

Associate professor, candidate of agricultural
sciences

Position, Basic curriculum

Signature

Gurina R.R.

Full name.

HEAD OF THE DEPARTMENT:

Department Technosphere safety

Name Basic Curriculum

Signature

Plyushikov V.G.

Full name.

HEAD OF THE HIGHER EDUCATION PROGRAM:

Director of the Department of Veterinary Medicine

Position, Basic curriculum

Signature

Vatnikov Yu.A.

Full name