

Radiation Hygiene

UNIVERSITY OF ZAGREB
FACULTY OF VETERINARY MEDICINE
Heinzelova 55
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Division: Basic and preclinical sciences
Organizational unit: Physiology and Radiobiology
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Register No of the organisational unit:
Zagreb, 9/9/2025



207150	REPUBLIKA HRVATSKA		
Veterinarski fakultet u Zagrebu			
Primljeno:	09.09.2025		
Klasifikacijska oznaka	Org. jed.		
602-04/25-22/34	251-61-41;251-61-32;		
Urudžbeni broj	Prilozi	Vrijednost	
251-61-06-25-66	0	-	

COURSE SYLLABUS

Course name: Radiation Hygiene
Academic year 2025/2026

Course leader: Assist. Prof. Jadranka Pejaković Hlede, DVM, PhD

Deputy course leader: (title, name and surname): Prof. Marinko Vilić, DVM, PhD

Teachers: Prof. Marinko Vilić, DVM, PhD; Assist. Prof. Jadranka Pejaković Hlede, DVM, PhD

First day of classes: 28/11/2025

Last day of classes: 22/01/2026

Radiation Hygiene

Activities - Radiation hygiene (1/3)									
Start Dat	Start	End	Subject	Subject	Group	Note	Length	Instructor	Room
28/11/2025	10:00	11:30	Radiation hygiene	p01 Introduction to radiation hygiene	5E-1, 5E-2, 5E-3		1:30	Pejaković Hlede J.	P_fiziologija
03/12/2025	9:45	11:15	Radiation hygiene	p02 Basic of nuclear physics	5E-1, 5E-2, 5E-3		1:30	Pejaković Hlede J.	P_fiziologija
05/12/2025	10:30	12:00	Radiation hygiene	v01 Personnel dosimeters	5E-2		1:30	Nastavnici na predmetu	V_radiobiologija
08/12/2025	10:45	12:15	Radiation hygiene	p03 Sources of ionizing radiation	5E-1, 5E-2, 5E-3		1:30	Pejaković Hlede J.	P_fizika
08/12/2025	12:30	14:00	Radiation hygiene	v01 Personnel dosimeters	5E-3		1:30	Nastavnici na predmetu	V_radiobiologija
12/12/2025	11:45	13:15	Radiation hygiene	p04 Biologically significant radionuclides	5E-1, 5E-2, 5E-3		1:30	Pejaković Hlede J.	P_fiziologija
12/12/2025	13:30	15:00	Radiation hygiene	v01 Personnel dosimeters	5E-1		1:30	Nastavnici na predmetu	V_radiobiologija
15/12/2025	12:15	13:45	Radiation hygiene	p05 Effects of ionizing radiation - classification	5E-1, 5E-2, 5E-3		1:30	Pejaković Hlede J.	P_fiziologija
16/12/2025	10:00	11:30	Radiation hygiene	v02 Radiation detectors	5E-3		1:30	Nastavnici na predmetu	V_radiobiologija
17/12/2025	10:15	11:45	Radiation hygiene	p06 Effects of ionizing radiation - mechanisms	5E-1, 5E-2, 5E-3		1:30	Pejaković Hlede J.	P_fiziologija
19/12/2025	8:15	9:45	Radiation hygiene	v02 Radiation detectors	5E-2		1:30	Nastavnici na predmetu	V_radiobiologija

Radiation Hygiene

Activities - Radiation hygiene (2/3)									
Start Dat	Start	End	Subject	Subject	Group	Note	Length	Instructor	Room
19/12/2025	10:00	11:30	Radiation hygiene	p07 Radioactive contamination	5E-1, 5E-2, 5E-3		1:30	Pejaković Hlede J.	P_fizika
22/12/2025	10:00	11:30	Radiation hygiene	v02 Radiation detectors	5E-1		1:30	Nastavnici na predmetu	V_radiobiologija
07/01/2026	8:45	10:15	Radiation hygiene	v03 Gamma ray spectrometry	5E-1		1:30	Nastavnici na predmetu	V_radiobiologija
07/01/2026	12:30	14:00	Radiation hygiene	v03 Gamma ray spectrometry	5E-3		1:30	Nastavnici na predmetu	V_radiobiologija
08/01/2026	9:30	11:00	Radiation hygiene	v03 Gamma ray spectrometry	5E-2		1:30	Nastavnici na predmetu	V_radiobiologija
08/01/2026	11:15	12:45	Radiation hygiene	p08 Sources and biological effects of non-ionizing radiation	5E-1, 5E-2, 5E-3		1:30	Pejaković Hlede J.	P_fizika
09/01/2026	9:30	11:00	Radiation hygiene	v04 Radiation protection	5E-3		1:30	Nastavnici na predmetu	V_radiobiologija
09/01/2026	13:00	14:30	Radiation hygiene	v04 Radiation protection	5E-2		1:30	Nastavnici na predmetu	V_radiobiologija
12/01/2026	9:15	10:45	Radiation hygiene	v04 Radiation protection	5E-1		1:30	Nastavnici na predmetu	V_radiobiologija
12/01/2026	12:45	14:15	Radiation hygiene	v05 Radiation risk	5E-2		1:30	Nastavnici na predmetu	V_radiobiologija
13/01/2026	10:00	11:30	Radiation hygiene	v05 Radiation risk	5E-3		1:30	Nastavnici na predmetu	V_radiobiologija

Radiation Hygiene

Activities - Radiation hygiene (3/3)									
Start Dat	Start	End	Subject	Subject	Group	Note	Length	Instructor	Room
13/01/2026	12:00	13:30	Radiation hygiene	v05 Radiation risk	5E-1		1:30	Nastavnici na predmetu	V_radiobiologija
14/01/2026	10:00	11:30	Radiation hygiene	v06 Radiation protection-Radiation Emergencies	5E-1		1:30	Nastavnici na predmetu	V_radiobiologija
15/01/2026	8:15	9:45	Radiation hygiene	v06 Radiation protection-Radiation Emergencies	5E-2		1:30	Nastavnici na predmetu	V_radiobiologija
15/01/2026	11:45	13:15	Radiation hygiene	v06 Radiation protection-Radiation Emergencies	5E-3		1:30	Nastavnici na predmetu	V_radiobiologija
16/01/2026	9:00	10:30	Radiation hygiene	v07 Non-ionizing radiation	5E-2		1:30	Nastavnici na predmetu	V_radiobiologija
16/01/2026	12:30	14:00	Radiation hygiene	v07 Non-ionizing radiation	5E-3		1:30	Nastavnici na predmetu	V_radiobiologija
19/01/2026	11:45	13:15	Radiation hygiene	v07 Non-ionizing radiation	5E-1		1:30	Nastavnici na predmetu	V_radiobiologija
22/01/2026	8:30	10:30	5 ENG	Radiation hygiene	5E-1, 5E-2, 5E-3	Colloquium	2:00	Pejaković Hlede J.	P_fiziologija
Total: 30							45:30		

Timetable for LECTURES academic year 2025/2026

STUDENT OBLIGATIONS

Lecture attendance	Students are required to attend at least 8 hours of lectures in order to receive the minimum of 3 points. Full attendance (16 hours) is awarded with the maximum of 6 points.
Practicals attendance	Students are required to attend at least 10 hours of practicals in order to receive the minimum of 8 points. Full attendance (14 hours) is awarded with the maximum of 12 points. In the case of a justified absence of up to 30%, the corresponding points will still be awarded. In the case of an unjustified absence of up to 30%, the corresponding points will not be awarded.
Active participation in practicals	During practicals, students take two short tests based on the material covered. Each test carries a maximum of 5 points. In total, students must achieve at least 5 points, while the maximum number of points that can be earned is 10.
Final exam	To qualify for the final exam, students must obtain at least 16 points from lecture and practical attendance combined with active participation, and at least 20 points from continuous assessment. The final exam is written, with a minimum of 24 points required to pass and a maximum of 40 points available. Students who do not pass the final part of the exam may retake it at the scheduled dates.
Examination requirements	Student requirements are defined in the Regulations on the Integrated Undergraduate and Graduate University Study of Veterinary Medicine (2024). In accordance with these Regulations, students must acquire a minimum number of points from all assessment elements in order to take the final exam. According to Article 41 , a student may be justifiably absent from up to 50% of lectures, 30% of seminars, and 30% of practicals.

GRADING AND EVALUATING STUDENT WORK

Continuous knowledge-checking (mid-terms)	One colloquium covering practical content; maximum 32 points, minimum 20 points to pass. Students who do not achieve the required points may take up to three repeat colloquia in scheduled terms. Colloquium dates: 22/01/2026; 10/02/2026; 19/02/2026
Final exams (dates)	11/12/2025; 10/02/2026; 19/02/2026
Form of final exam	Written

LITERATURE

Radiation Hygiene

Obligatory literature	Howard B.J., Beresford N.A., Voigt G. (2001): Countermeasures for animal products: a review of effectiveness and potential usefulness after an accident. <i>Journal of Environmental Radioactivity</i> 56, 115–137. International Atomic Energy Agency (IAEA) (2010): Radiation biology, a handbook for teachers and students. Training Course Series No. 42. IAEA, Vienna. International Atomic Energy Agency (IAEA) (2021): Nuclear and radiological emergencies in animal production systems, preparedness, response and recovery. Naletoski I., Luckins A.G., Viljoen G. (eds.). 1st ed. Springer, Berlin, Heidelberg (selected chapters). International Atomic Energy Agency (IAEA) (2021): Radiation protection and safety in veterinary medicine. IAEA Safety Reports Series No. 104. IAEA, Vienna. Statkiewicz-Sherer M.A., Visconti P.J., Ritenour E.R. (2002): Radiation protection in medical radiography. 4th ed. Mosby, St. Louis (selected chapters). Vilić M. (2014): Radiation hygiene, selected chapters of radioecology, radiobiology and radiation hygiene. Internal teaching material (script), Faculty of Veterinary Medicine, University of Zagreb.
Optional literature	Eisenbud, M. (1997): Environmental Radioactivity. 5th ed. Academic Press. London. Hall, J. E., A. J. Giaccia (2019): Radiobiology for the radiologist. 8th ed. Wolters Kluwer. Philadelphia. International Atomic Energy Agency - IAEA (2019): IAEA Safety glossary. Terminology used in nuclear safety and radiological protection. International Atomic Energy Agency, Vienna.

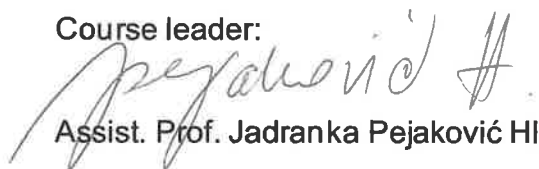
OBJECTIVES AND LEARNING OUTCOMES

Course objectives	The aim of the Radiation Hygiene course is to provide students, building on their knowledge of natural and preclinical sciences (e.g. physiology), with essential knowledge and skills in radiation protection, radioecology and radiobiology. Through lectures and practical classes, students gradually develop a comprehensive understanding of the fundamental principles of radiation protection. The course also introduces the biological effects of ionizing and non-ionizing (microwave) radiation on animals and humans, which are crucial for work in radiology, veterinary nuclear medicine and other veterinary activities involving electromagnetic radiation. Completion of this course is a legal requirement for performing X-ray examinations and procedures with open radioactive isotopes (veterinary nuclear medicine), and it is also necessary for professional work in veterinary inspection and for certain tasks in animal hygiene.
Learning outcomes	Upon successful completion of the course, students will be able to: • Differentiate between sources and types of ionizing and non-ionizing radiation and explain their biological effects. • Evaluate modes of exposure and pathways of radioactive contamination in humans and animals, and analyse the consequences of exposure and contamination. • Apply radiation protection measures for humans and animals in accordance with established principles of radiation safety. • Apply methods of radioactive decontamination for humans, animals, food, water and the environment. • Assess the radiation hygiene compliance of food and animal feed. • Use radiation measuring instruments (detectors and dosimeters) and interpret measurement results for risk assessment and management. • Explain the use of ionizing radiation for food preservation and form an evidence-based opinion on its application.

GRADING SCHEME

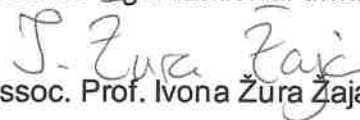
<i>Points</i>	<i>Grade</i>
Up to 59	1 (F)
60-76	2 (D, E)
77-84	3 (C)
85-92	4 (B)
93-100	5 (A)

Course leader:



Assist. Prof. Jadranka Pejaković Hlede, DVM, PhD

Head of organizational unit:



Assoc. Prof. Ivona Žura Žaja, DVM, PhD

Note: The course leader is required to submit a Course Syllabus to all teachers and associates pertaining to the Course