



Лектор курсу
Контактна інформація
лектора (e-mail)
Сторінка курсу в eLearn

СИЛАБУС ДИСЦИПЛІНИ «Radiobiology and radioecology»

Ступінь вищої освіти - Bachelor
Спеціальність - 101 «Ecology»
Освітня програма - «Ecology»
Рік навчання - 3-st, семестр 5-th
Форма навчання - full-time and part-time
Кількість кредитів ЄКТС - 4
Мова викладання - English

Ph.D., senior lecturer Volodymyr Illienko
illienkovv@gmail.com

<https://elearn.nubip.edu.ua/course/view.php?id=835>

COURSE DESCRIPTION

(до 1000 друкованих знаків)

Radiobiology, or radiation biology, is the science of the effects of ionizing radiation on living organisms and their groups.

Radioecology, or radiation ecology, is a branch of radiobiology that emerged at its junction with ecology. Radioecology studies the concentrations and migration of radioactive substances (radionuclides) in the environment and the effect of their ionizing radiation on living organisms and their groups.

The main task of radiobiology is to reduce the damaging effects of ionizing radiation on living organisms, especially humans, by reducing their impact on molecular and cellular structures through various factors of physical and chemical nature, limiting the entry of radioactive substances into the body by food chains, their excretion, induction post-radiation recovery processes.

The main purpose of studying the discipline "Radiobiology and Radioecology" is to master in-depth knowledge of the nature of ionizing radiation, their effects on living organisms, mastering the applied aspects of the specialty related to radiation safety, and practical application of knowledge to solve research and applied problems.

Acquisition of competencies:

Integrated competency (IC): the ability to solve complex specialized problems and solve practical problems in the field of ecology, environmental protection and balanced nature management, which involves the application of basic theories and methods of environmental sciences, which are characterized by complexity and uncertainty of conditions.

General competencies (GC):

GC1. Knowledge and understanding of the subject area and professional activity.

GC8. Ability to conduct research at an appropriate level.

Professional (special) competencies (PC):

PC5. Ability to assess the impact of technogenesis processes on the environment and identify environmental and radiation risks associated with production activities.

PC11. The ability to inform the public about the state of environmental security and balanced nature management.

Program learning outcomes (PLO):

PLO9. Demonstrate skills in assessing unpredictable environmental problems and thoughtfully choosing ways to solve them.

PLO22. Participate in the development of projects and practical recommendations for environmental protection.

STRUCTURE OF COARSE

Topic	Hours (lectures/ practical works)	Results of study	Task	Evaluation
Module 1. Introduction. Physical foundations of radiobiology and radioecology				
Delivery of all practical works and performance of independent works takes place including in the elearn platform				
Topic 1. Introduction to radiobiology. History	2/4	Know the main stages of development of world and domestic radiobiology	Assess the contribution of Ukrainian radiobiologists to world radiobiology and radioecology	6
Topic 2. Physical foundations of radiobiology	2/4	Understand the basic physical processes of interaction of ionizing radiation with substances of living cells	Solving problems on the translation of radioactivity units and doses in the SI system and non-system units	7
Topic 3. Sources of radioactive substances and ionizing radiation	2/2	Distinguish between natural and artificial radionuclides; family-forming and non-family	Analyze the contribution of various sources in the formation of the radiation background of the environment	7
Total module 1				20
Module 2. Biological effect of ionizing radiation on living organisms				
Delivery of all practical works and performance of independent works takes place including in the elearn platform				
Topic 4. Biological effects of ionizing radiation on plants and animals	2/2	Analyze radiobiological effects, distinguish between somatic and genetic, near and far, deterministic and stochastic	Justify the stochasticity of certain radiobiological effects	5
Topic 5. Radiosensitivity of	2/2	Know the levels of semi-lethal doses for different species of organisms: plants	Give examples of calculation of LD50 and LD100	5

plants, animals and other organisms		and animals, humans, protozoa, bacteria and viruses		
Topic 6. Radiation protection and radiosensitization	2/4	Understand and know the basic means of physical and chemical-pharmacological means of radiation protection	Give examples of CCU and FZD evaluation for the most effective radioprotectors	6
Topic 7. Post-radiation recovery of plants and animals	2/2	Distinguish the main ways of post-radiation recovery of the organism.	Evaluate the comparative contribution of individual pathways of post-radiation recovery to the overall recovery of higher plants and animals.	4
Total module 2				20
Module 3. Agriculture in the conditions of radionuclide contamination				
Delivery of all practical works and performance of independent works takes place including in the elearn platform				
Topic 8. Migration of radionuclides in the environment and agricultural facilities	4/2	Know the trophic chains of radionuclides in plants, animals and humans	Assess the contribution of individual routes of radionuclides to the human body in different periods of the Chernobyl accident	6
Topic 9. Measures to reduce the inflow of radionuclides into crop and livestock products	4/4	Know the basic measures to minimize the entry of radionuclides into the human body at all stages of the food chain	To evaluate the comparative effectiveness of individual methods of reducing the supply of radionuclides in crop and livestock products on the formation of the human radiation dose.	7
Topic 10. Application of ionizing radiation in agricultural production and other spheres of human activity and method of isotopic indicators in biology and ecology.	6/4	Know the basic techniques and technologies for the use of ionizing radiation in agriculture, medicine, food industry and other areas of the economy.	To analyze the current opportunities and prospects of Ukraine for the widespread introduction of radiation and biological technologies in various sectors of the economy.	7
Total module 3				20
Additional points				10
Total for the semester				70
Exam				30
Total for the course				100

ASSESSMENT POLICY

<i>Deadline and recompilation policy:</i>	Works that are submitted in violation of the deadlines for more than a week without good reason are evaluated at a lower score (maximum - 20% of the maximum). Rearrangement of modules takes place with the permission of the lecturer if there are good reasons (for example, hospital or family problems).
<i>Academic Integrity Policy:</i>	Writing while writing modular test papers and the final exam is prohibited. The use of mobile devices during these periods is also prohibited.
<i>Visiting policy:</i>	Attendance is mandatory. For objective reasons (for example, illness, international internship) training can take place individually (in online form in consultation with the dean of the faculty). In case of violations and abuses (non-attendance more than 50% of the time - non-admission to the exam)

SCALE OF ASSESSMENT OF STUDENT KNOWLEDGE

Rating of the applicant of higher education, points	The assessment is national for the results of examinations	
	exams	offsets
90-100	perfectly	credited
74-89	good	
60-73	satisfactorily	
0-59	unsatisfactorily	not credited

RECOMMENDED SOURCES OF INFORMATION

1. <https://elearn.nubip.edu.ua/enrol/index.php?id=835> Radiobiology and Radioecology
2. Gudkov I. M. Radiobiology and Radioecology (in English): Textbook for students of higher educational institutions. Вид. 2-е, переробл. та допов. К.: НУБіП України, Житомирська політехніка, 2019. 384 с.
3. Gudkov I. M. Radiobiology and Radioecology / I. M. Gudkov, M. M. Vinichuk. – К. : NAUU, 2006. – 295 p.
4. Choppin G. R., Liljenzin J.-O., Rydberg J. Radiochemistry and nuclear chemistry. 4th ed., Academic Press, 2013, 858 p.
5. Chernobyl: 30 Years of Radioactive Contamination Legacy. Report. Lead writer and coordination of report: Prof. Valerii Kashparov, Kyiv, 2016, 59 p.
6. Climate change and nuclear power. International Atomic Energy Agency, VIENNA, 2005, 112 p.
7. Natural and induced radioactivity in food. International Atomic Energy Agency, VIENNA, 2002, 136 p.
8. Gleyzes, C., Tellier, S. & Astruc, M. Fractionation studies of trace elements in contaminated soils and sediments: a review of sequential extraction procedures. Trac-Trends in Analytical Chemistry, 21 (6-7), 2002, p. 451-467.
9. International Atomic Energy Agency Safety Standards Series No. RS-G-1.8, Environmental and Source Monitoring for Purposes of Radiation Protection for protecting people and the environment, Safety Guide, IAEA, VIENNA, 2005, p.119.

10. Radiation biology: a handbook for teachers and students. International Atomic Energy Agency, VIENNA, 2010, 150 p.
11. Гродзинський Д.М. Радіобіологія. – К.: Либідь, 2000. – 448 с.
12. Гудков І.М. Радіобіологія: підручник. – Херсон : Олді-Плюс, 2016. – 504 с.
13. Гудков І.М., Гайченко В.А., Кашпаров В.О. Сільськогосподарська радіоекологія: підручник. – К.: Ліра-К, 2017. – 268 с.
14. Кічно В.О., Поліщук С.В., Гудков І.М. Основи радіобіології та радіоекології. – К.: Хай-Тек Прес, 2008 (2009). – 316 с.
15. НРБУ-97/2000.
16. Хомутінін Ю.В., Кашпаров В.О., Жебровська К.І. Оптимізація відбору і вимірювань проб при радіоекологічному моніторингу, Монографія. – К.: Український науково–дослідний інститут сільськогосподарської радіології, 2002, 160 с.
17. Паренюк О.Ю., Ілленко В.В., Гудков І.М. Мікрофлора забруднених радіонуклідами ґрунтів. – К.: Вид-во НУБіП України, 2018. – 198 с.
18. Бондар О.І., Фещенко В.П., Гудков І.М., Гуреля В.В. Радіоекологічний термінологічний словник (україно-англійсько-російський). – Житомир: ПП Експертний центр Укреколбіокон, 2018. – 254 с.
19. Якість ґрунту. Методи відбору проб ґрунту для радіаційного контролю, СОУ 74.14-37-425:2006.
20. Якість ґрунту. Визначення щільності забруднення території сільськогосподарських угідь радіонуклідами техногенного походження, СОУ 74.14-37-424:2006
21. Якість продукції рослинництва. Методи відбору проб для радіаційного контролю, СОУ 01.1-37-426:2006.
22. Якість продукції тваринництва. методи відбору проб для радіаційного контролю, СОУ 01.2-37-427:2006.
23. Якість продукції тваринництва. Проведення прижиттєвого контролю тварин на територіях, забруднених радіонуклідами, СОУ 01.2-37-428:2006.