

DOCTORAL STUDIES COURSE UNIT DESCRIPTION

Name of subject	Scientific Field	Center	Department
Radioecology (8 ECTS credits)	Physics N 002	Center for Physical Sciences and Technology	Nuclear Research
Student's workload	Hours	Student's workload	Hours
Lectures	10	Consultations	4
Individual study	186	Seminars	

Course annotation

The essence of radiation ecology, research objects, aims, scope of problems, modern trends and effective methods in research. Naturally occurring and technogenic sources of ionizing radiation. Production, elicitation and use of radioactive isotopes in medicine, industry and science. Dispersion peculiarities of radionuclides in different physical forms and chemical compounds in the environment: migration and accumulation in terrestrial, marine and freshwater ecosystems. Radionuclide transport via food chains: atmosphere, aquatic medium and bottom sediments, soil, vegetation, animals, food, man. Radiation safety and problems of radiation ecology related to the nuclear facilities. Consequences of accidents at nuclear facilities. Biological effects of ionizing radiation exposure, radionuclide toxicology, epidemiological studies related to human exposure. Assessment of ionizing radiation exposure doses, risks and effects, application in medicine. Protection methods and measures.

List of literature

1. Remeikis V. Radiacinė ekologija. Vilnius, 2007, 160 p.
2. Radioecology. Radioactivity & Ecosystems The effect of Radiation on Biocoenoses An update on Radionuclides Transfer in the Food Web. Van der Stricht & Kirchmann, Editors, June 2001. 624 pages. ISBN 2-9600316-0-1.
3. Radiochemistry and Nuclear Chemistry, Third Edition by Gregory Choppin, JAN RYDBERG, and Jan-Olov Liljenzin. 2001. ISBN: 0750674636.
4. D. Butkus. Jonizuojančioji spinduliuotė aplinkoje. Vilnius, 2006. 292 p.
5. T. Nedveckaitė. Radiacinė sauga Lietuvoje. Vilnius, 2004. 239 p.
6. Cottingham W.N., Greenwood D.A. An introduction to nuclear physics. Cambridge, 2001, 272 p
7. J. E. Martin. Physics for Radiation Protection. A Handbook. WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 2006. 822 p.
8. Herman Cember, Thomas E. Johnson. Introduction to Health Physics. The McGraw-Hill Companies, Inc. 2009, 873 p.
9. Radiation Biology: A Handbook for Teachers and Students. IAEA Training course series No. 42, Vienna , 2010, 151 p
10. Sources, Effects and Risks of Ionizing Radiation. United Nations Scientific Committee on the Effects of Atomic Radiation. UNSCEAR 2000 Report to the General Assembly, with scientific annexes. Volume II: EFFECTS. ANNEX J Exposures and effects of the Chernobyl accident.
11. Sources, Effects and Risks of Ionizing Radiation. United Nations Scientific Committee on the Effects of Atomic Radiation UNSCEAR 2013 Report to the General Assembly with Scientific Annexes. VOLUME I Scientific Annex A Levels and effects of radiation exposure due to the nuclear accident after the 2011 great east-Japan earthquake and tsunami.

Consulting teachers	Scientific degree	Pedagogical name	Main scientific works published in a scientific field in last 5 year period
Evaldas Maceika	Dr.		<ol style="list-style-type: none"> <li data-bbox="850 315 1428 607">1. Konstantinova, Marina; Lukšienė, Benedikta; Tarasiuk, Nikolaj; Maceika, Evaldas. Estimation of Cs isotope accumulation by litter, moss and grass in Lithuania attributed to the Fukushima Daiichi NPP accident // Journal of geochemical exploration. ISSN 0375-6742. Vol. 174 (2017), p. 159-163. <li data-bbox="850 618 1428 1238">2. Marčiulionienė, Elena Danutė; Lukšienė, Benedikta; Montvydienė, Danguolė; Jefanova, Olga; Mažeika, Jonas; Taraškevičius, Ričardas; Stakėnienė, Rimutė; Petrošius, Rimantas; Maceika, Evaldas; Tarasiuk, Nikolaj; Žukauskaitė, Zita; Kazakevičiūtė, Laima; Volkova, Marija. ¹³⁷Cs and plutonium isotopes accumulation/retention in bottom sediments and soil in Lithuania: A case study of the activity concentration of anthropogenic radionuclides and their provenance before the start of operation of the Belarusian Nuclear Power Plant (NPP) // Journal of environmental radioactivity. ISSN 0265-931X. Vol. 178-179 (2017), p. 253-264. <li data-bbox="850 1249 1428 1581">3. Tarasyuk, Nikolay; Lukšienė, Benedikta; Maceika, Evaldas; Filistovičius, Vitoldas; Žukauskaitė, Zita; Nedzveckienė, Laima; Buivydas, Šarūnas. Study of the formation of the primary ¹³⁷Cs vertical profile in the organic matter-rich sediments // Journal of environmental radioactivity. ISSN 0265-931X. Vol. 177 (2017), p. 206-217. <li data-bbox="850 1592 1428 2065">4. Barisevičiūtė, Rūta; Maceika, Evaldas; Ežerinskis, Žilvinas; Mažeika, Jonas; Butkus, Laurynas; Šapolaitė, Justina; Garbaras, Andrius; Paškauskas, Ričardas; Jefanova, Olga; Karosienė, Jūratė; Kasperovičienė, Jūratė; Remeikis, Vidmantas. Tracing carbon isotope variations in lake sediments caused by environmental factors during the past century: a case study of lake Tapeliai, Lithuania // Radiocarbon. ISSN 0033-8222. eISSN 1945-5755. 2019, vol. 61, no. 4, p. 885-903.

			<p>5. Žukauskaitė, Zita; Lukšienė, Benedikta; Filistovičius, Vitoldas; Tarasyuk, Nikolay; Maceika, Evaldas; Kazakevičiūtė-Jakučiūnienė, Laima. Experimental and modelling studies of radiocesium sorption/desorption processes in the fixed-bed moss column // Journal of environmental radioactivity. ISSN 0265-931X. 2019, vol. 203, p. 1-7.</p> <p>6. Ežerinskis, Žilvinas; Šapolaitė, Justina; Pabedinskas, Algirdas; Juodis, Laurynas; Garbaras, Andrius; Maceika, Evaldas; Druteikienė, Rūta; Lukauskas, Darius; Remeikis, Vidmantas. Annual variations of ¹⁴C concentration in the tree rings in the vicinity of Ignalina Nuclear Power Plant // Radiocarbon. ISSN 0033-8222. 2018, vol. 60, no. 4, p. 1227-1236.</p>
<p>Certified during Doctoral Committee session 02/02/2022, protocol No. (7.17 E) 15600-KT-32</p>			<p>Committee Chairman prof. S. Juršėnas</p>