

Subject card

Subject name and code	Radiochemistry of Environment, PG_00168463						
Field of study	Radiochemia środowiska						
Date of commencement of studies	October 2025		Academic year of realisation of subject			2026/2027	
Education level	Bachelor's studies		Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study	
Mode of study	full-time studies		Mode of delivery			at the university	
Year of study	2		Language of instruction			Polish	
Semester of study	4		ECTS credits			6.0	
Learning profile	academic		Assessment form			exam	
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Dagmara Strumińska-Parulska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	30.0	0.0	0.0	75
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	75		0.0		75.0	150
Subject objectives	familiarizing students with all issues mentioned in the lecture and laboratories program content						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BJORL3_U01] can formulate the basic laws of physics and chemistry using mathematical formalism	understands the basic concepts of radiochemistry and radiotoxicology	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU2] prezentacja/projekt/referat/ raport [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny
	[BJORL3_U03] is able to use the formalism of physics and chemistry to describe phenomena in the microworld; is able to use the methodology of biology and ecology to an elementary extent when describing the effects of radiation on biological objects and in the environment	1. recognizes the most important natural and artificial radionuclides contained in environment and man, 2. can determine the most important radionuclides 3. understands the background of radiometric techniques,	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU2] prezentacja/projekt/referat/ raport [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny
	[BJORL3_W01] has a general knowledge of the basic concepts and principles of nuclear physics and chemistry, understands their historical development and their importance not only for nuclear safety and radiation protection, but also for understanding the modern world; has a basic knowledge of biology and ecology	1. knows and understands the basic concepts related to the structure of the atomic nucleus, elementary particles and processes occurring in the nucleus, 2. understands the importance of radioactivity in the synthesis of chemical elements and the development and evolution of life on Earth, 3. has knowledge about natural and artificial radioactive elements and their occurrence in nature	[SW4] test/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/ dyskusja [SW2] prezentacja/projekt/referat/ raport [SW3] opracowanie tekstowe/ praca pisemna
	[BJORL3_W06] knows the basic computational methods used to solve typical problems in radiological protection and nuclear safety	knows the radiological effect of the catastrophes at Chernobyl and Fukushima nuclear power plants, knows the goals and tasks of monitoring environmental radioactive contamination.	[SW4] test/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/ dyskusja [SW2] prezentacja/projekt/referat/ raport [SW3] opracowanie tekstowe/ praca pisemna
	[BJORL3_W05] has knowledge of the elementary components of matter and the types of fundamental interactions between them, the manifestations of these interactions in phenomena occurring at scales ranging from subatomic to subatomic, knows the time and energy scales associated with these phenomena; knows the basics of biology and ecology in understanding the biological and ecological aspects of nuclear safety and radiation protection	knows and understands the basic concepts of radiochemistry, radioecology and radioecology	[SW4] test/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/ dyskusja [SW2] prezentacja/projekt/referat/ raport [SW3] opracowanie tekstowe/ praca pisemna
	[BJORL3_U04] Can use mathematical and computer apparatus to analyze and solve problems in radiological protection and nuclear safety	is able to assess radiological threats arising as a result of local or global contamination of radioactivity	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU2] prezentacja/projekt/referat/ raport [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny
	[BJORL3_W07] knows the construction and basic principles of operation of scientific apparatus used in radiological protection and aimed at ensuring nuclear safety	understands the idea of radiometric methods,	[SW4] test/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/ dyskusja [SW2] prezentacja/projekt/referat/ raport [SW3] opracowanie tekstowe/ praca pisemna

Subject contents	Nuclear reactions. Activity and its units. Natural and artificial radioactive elements in the environment. Radioactive series and radioactive imbalance. Sources of radionuclides. Radiochemical methods and radiometry in the analysis of natural and artificial radionuclides in environmental samples. Environmental contamination after the Chernobyl and Fukushima nuclear disasters.		
	Exercise auditorium: Environmental sampling - marine and terrestrial; sampling strategies, methods and sampling equipment. Research ships. Determination of alpha radioisotopes.		
	Exercise laboratory: Pipetting. Co-precipitation. Radiochemical analysis of polonium and uranium. Preparation of measurement preparations for alpha spectrometry.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	writing test	51.0%	60.0%
	report	51.0%	20.0%
	colloquium	51.0%	20.0%
Recommended reading	Basic literature	B. Skwarzec, Radiochemia środowiska i ochrona radiologiczna, Wydawnictwo DJ s.c, Gdańska, 2002 W. Szymański, Chemia jądrowa, PWN, Warszawa 1996	
	Supplementary literature	Skwarzec B., Determination of radionuclides in aquatic environment, Analytical measurements in aquatic environments, CRC Press, Taylor&Francis Group, 2010,	
	eResources addresses		
Example issues/ example questions/ tasks being completed	not applicable		
Work placement	Not applicable		

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