University of Gdańsk

Subject card

Subject name and code	Radiochemistry of Environment, PG_00204574						
Field of study	Nuclear safety and radiological protection						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
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	4.0			
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	0.0	30.0	0.0	0.0	60
	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	60		0.0		40.0	100
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_U03] Is able to use the formalism of physics and chemistry to describe phenomena in the microworld.	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] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU4] test/exam - oral or written
[BJORL3_W01] Has a detailed 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.	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/exam - oral or written [SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BJORL3_W05] Has advanced 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 and understands the basic concepts of radiochemistry, radioecology and radioecology	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BJORL3_W06] Knows advanced 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/exam - oral or written [SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BJORL3_W07] Has advanced knowledge of the construction and principles of operation of scientific apparatus used in radiological protection and nuclear safety.	understands the idea of radiometric methods,	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BJORL3_U01] Can formulate the laws of physics and chemistry using mathematical formalism.	understands the basic concepts of radiochemistry and radiotoxicology	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU4] test/exam - oral or written
[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] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU4] test/exam - oral or written

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
	colloquium	51.0%	20.0%
	writing test	51.0%	60.0%
	report	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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