University of Gdańsk

Subject card

Subject name and code	Nuclear Chemistry, PG_00199406						
Field of study	Nuclear safety and radiological protection						
Date of commencement of studies	October 2026		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	1		Language of instruction	Polish			
Semester of study	2		ECTS credits	4.0			
Learning profile	academic		Assessment form	exam			
Conducting unit	Laboratory of Environmental Analytics and Radiochemistry -> Department of Environmental Chemistry and Radiochemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Bogdan Skwarzec				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	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	The aim of the course is to familiarize chemistry students with the content of lectures and auditorium exercises in nuclear chemistry and to consolidate the knowledge resulting from the physical and chemical processes occurring in the atomic nucleus.						

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.	can use knowledge of physics and chemistry to describe the impact of radiation on biological organisms in the natural environment	[SU1] oral statement/conversation/ discussion [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.	can use mathematical apparatus to analyze and solve problems in the field of radiological protection and nuclear safety	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written
	[BJORL3_U01] Can formulate the laws of physics and chemistry using mathematical formalism.	can formulate the basic laws of physics and chemistry	[SU1] oral statement/conversation/ discussion [SU3] text preparation/written work [SU4] test/exam - oral or written
	[BJORL3_W07] Has advanced knowledge of the construction and principles of operation of scientific apparatus used in radiological protection and nuclear safety.	knows the structure and basic principles of operation of scientific equipment used in radiological protection	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW3] text preparation/written work
	[BJORL3_W06] Knows advanced computational methods used to solve typical problems in radiological protection and nuclear safety.	knows the basic computational methods used to solve typical problems in the field of radiological protection and nuclear safety	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW3] text preparation/written work
	[BJORL3_W04] Knows selected techniques of higher mathematics to the extent necessary to describe phenomena at the subatomic level and solve problems in physics and nuclear chemistry.	knows basic techniques in nuclear physics and chemistry	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW3] text preparation/written work
	[BJORL3_W03] Knows how to plan and perform a simple physical or chemical experiment and analyze the results obtained; knows the elements of the theory of measurement uncertainty as applied to experiments; knows the basic units of the SI system and its most important derived units; knows other systems of measurement units.	knows how to plan and perform a simple physical or chemical experiment and analyze the obtained results;	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW3] text preparation/written work
	[BJORL3_W02] Understands the role of physical and chemical experimentation, mathematical theoretical models approximating reality, and computer simulations in scientific research methodology; is aware of technological, apparatus, and methodological limitations in scientific research.	understands the role of physical and chemical experiment in the methodology of scientific research; is aware of technological, equipment and methodological limitations in scientific research	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [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.	has knowledge of the elementary components of matter and ecological aspects of nuclear safety and radiological protection	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW3] text preparation/written work
	[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.	understands nuclear chemistry for nuclear safety and radiological protection and for understanding the modern world; has basic knowledge of biology and ecology	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW3] text preparation/written work
Subject contents	structure of matter and elementary particles, radioactivity, process of formation of chemical elements, natural and artificial radioactive elements, radiogenic heat of the Earth, nuclear energy, interaction of ionizing radiation with matter, radiation chemistry and radiolysis of water, dosimetry, radiometric and radiochemical methods, isotope separation and labeling methods compounds, use of radionuclides in science, technology and medicine.		

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<tr><td>Prerequisites and co-requisites</td><td colspan="3">• knowledge of the theory of the structure of matter and atoms of chemical elements
• lecture on the basics of chemistry and physics</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>written test</td><td>51.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">• Bogdan Skwarzec, Environmental radiochemistry, University of Gdańsk Publishing House, 2021, ISBN 978-83-8206-111-6
• Sobkowski J. Jelińska-Kaźmierczuk M., Nuclear chemistry, Adamantan Publishing House, Warsaw 2006, ISBN: 83-7350-080-4</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">not applicable</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">• The main elementary particles
• Radioactive decay
• Radiation doses</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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