


**KAPITAŁ LUDZKI**  
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez  
 Unię Europejską w ramach  
 Europejskiego Funduszu  
 Społecznego

**UNIA EUROPEJSKA**  
 EUROPEJSKI  
 FUNDUSZ SPOŁECZNY


<b>Course title</b>		<b>ECTS code</b>	
Radiochemical methods and radiometric techniques for environment		13.3.1224	
<b>Name of unit administrating study</b>			
null			
<b>Studies</b>			
<b>faculty</b>	<b>field of study</b>	<b>type</b>	second tier studies (MA)
Faculty of Chemistry	Chemical Business	<b>form</b>	full-time
		<b>specialty</b>	all
		<b>specialization</b>	all
Faculty of Chemistry	Chemistry	<b>type</b>	second tier studies (MA)
		<b>form</b>	full-time
		<b>specialty</b>	all
Faculty of Chemistry	Environmental Protection	<b>specialization</b>	all
		<b>type</b>	second tier studies (MA)
		<b>form</b>	full-time
		<b>specialty</b>	all
		<b>specialization</b>	all
<b>Teaching staff</b>			
dr hab. Dagmara Strumińska-Parulska, profesor uczelni; dr Grzegorz Olszewski			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b>	
<b>Forms of classes</b>		2	
Lecture			
<b>The realization of activities</b>			
classroom instruction, online classes			
<b>Number of hours</b>			
Lecture: 15 hours			
<b>The academic cycle</b>			
2023/2024 winter semester			
<b>Type of course</b>		<b>Language of instruction</b>	
an elective course		english	
<b>Teaching methods</b>		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
Lecture based on the multimedia presentation – in-class or online learning		<b>Final evaluation</b>	
		Graded credit	
		<b>Assessment methods</b>	
		exam	
		<b>The basic criteria for evaluation</b>	
		The criteria according to UG regulations for students	
<b>Method of verifying required learning outcomes</b>			
<b>Required courses and introductory requirements</b>			
<b>A. Formal requirements</b>			
lack			
<b>B. Prerequisites</b>			
lack			
<b>Aims of education</b>			
Familiarize students with the topics of the course content.			
<b>Course contents</b>			

<p>Ionizing radiation and nuclear reactions. Radiometric and non-radiometric techniques in radionuclides determination. Nuclear chemistry in trace analysis: alpha, beta and gamma spectrometry. Neutron activation analysis. Environmental samples preparation for radiochemical analysis. Radioanalytical tracers. Radionuclides concentration: digestion and coprecipitation. Radioactive elements separation and purification. Sequential analysis. Radioisotopes activities calculations. Validation. Reference materials. Calibration.</p>	
<p><b>Bibliography of literature</b></p> <p>Literature required to pass the course</p> <p>Lecture content</p> <p>L'Annunziata M., Handbook of Radioactivity Analysis, Elsevier, 2012</p> <p>Extracurricular readings</p> <p>Magil J., Galy J., Radioactivity · Radionuclides · Radiation, Springer, 2005</p>	
<p><b>The learning outcomes (for the field of study and specialization)</b></p> <p>Chemical Business:</p> <p>K_BChII_W02: knows and understands the axiological conditions regarding the use of modern techniques and measuring instruments as well as IT tools in chemistry, taking into account economic aspects</p> <p>K_BChII_U02: is able to define his/her interests, develop them within the chosen field of study and in connection with the subject of the master's thesis by implementing the process of self-education and planning his/her professional career</p> <p>K_BChII_U03: is able to present, based on the current state of knowledge, scientific discoveries and the results of own research in the field of chemical and economic sciences, through skilful debate and public speeches</p> <p>K_BChII_K03: is willing to critically assess the level of his/her own knowledge in the light of the achievements of the studied scientific discipline</p> <p>K_BChII_K04: is willing to properly assess the acquired knowledge, respect it and disseminate it in order to solve specific cognitive and practical issues</p> <p>K_BChII_K05: is willing to act independently for the environment in order to fulfill certain social obligations</p> <p>Chemistry:</p> <p>K_W03: demonstrates in-depth knowledge in the field of modern measuring techniques used in chemical analysis</p> <p>K_W05: has extended knowledge in the field of the specialisation studied</p> <p>K_U03: finds necessary information in specialist literature, databases and other sources, lists basic scientific journals in chemistry</p> <p>K_U04: applies acquired knowledge of chemistry and related scientific disciplines</p> <p>K_U07: defines and implements the directions of own further education</p> <p>K_K01: knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so</p> <p>K_K03: understands the need for systematic work on various projects of a long-term nature and knows how to set priorities for the implementation of undertaken tasks</p> <p>K_K06: undertakes research tasks consciously and responsibly, understanding the social aspects of the practical application of the acquired knowledge and skills and the responsibility related to it</p> <p>Environmental Protection:</p> <p>K_OŚII_W03: characterises the effects of human</p>	<p><b>Knowledge</b></p> <ol style="list-style-type: none"> <li>knows and understands the basic concepts of radiochemistry,</li> <li>knows basic non-radiometric and radiometric techniques used in radionuclides determination,</li> <li>understands the concept of alpha, beta and gamma spectrometry,</li> <li>has knowledge on the neutron activation analysis,</li> <li>has knowledge about the environmental samples preparation,</li> <li>understands the concept of radioanalytical tracers,</li> <li>knows how to digest, separate and purify some radioactive elements.</li> </ol>
	<p><b>Skills</b></p> <ol style="list-style-type: none"> <li>understands the concepts of radiometric methods,</li> <li>recognizes the most important spectrometry techniques: alpha, beta, gamma,</li> <li>can present the sequential radiochemical analysis,</li> <li>is able to calculate radioisotopes activities and activity concentrations,</li> </ol>
	<p><b>Social competence</b></p> <ol style="list-style-type: none"> <li>understands the need for further education in the field of radiochemical analysis,</li> <li>demonstrates creativity in designing the sequential analysis for different elements,</li> <li>can transfer knowledge in the society about sources of radiochemical method used in industry and everyday life,</li> </ol>

<p>interference in the natural environment and explains the mechanisms of reaction of living organisms to its pollution</p> <p>K_OŚII_W04: chooses methods, techniques and research tools used in environmental protection</p> <p>K_OŚII_U01: on the basis of the acquired knowledge, proposes to solve environmental problems</p> <p>K_OŚII_U02: uses advanced measurement and analytical techniques used in environmental protection</p> <p>K_OŚII_U05: searches, selects and analyses the literature achievements of environmental sciences, including scientific journals and databases, reading and understanding scientific texts in her/his native</p> <p>K_OŚII_K03: undertakes professional and personal challenges, shows activity, undertakes efforts and is characterized by perseverance in undertaking individual and team actions in the field of environmental protection</p> <p>K_OŚII_K10: has a need for continuous professional development</p>	
<b>Contact</b> dagmara.struminska@ug.edu.pl	