



Subject card

Subject name and code	, PG_00059021						
Field of study	Nanotechnology						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2023/2024		
Education level	first-cycle 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	3		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Inorganic Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Jarosław Chojnacki				
	Teachers		dr inż. Anna Ordyszewska dr hab. Katarzyna Kazimierczuk prof. dr hab. inż. Jarosław Chojnacki				
Lesson types and methods of instruction	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		5.0		60.0	125
Subject objectives	The lecture and laboratory experiments are aimed at demonstration on selected examples how the properties of the elements and their compounds including coordination compounds can be traced in nature and used in man-made products.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W05		Student knows the properties of the elements, the influence of structure on these properties and their importance in everyday life. He gives examples of importance of coordination compounds in chemistry including chemistry of nanomaterials. Appreciates the global (or local) effects that are the result of uncontrolled introduction into the environment of certain chemicals (ozone, CO2, freons, SOx). He knows the chemical basis for obtaining and modifying materials important in nanotechnology (aerogels, xerogels etc.).		[SW1] Assessment of factual knowledge		
	K6_U01		The student knows how to obtain information from literature and other sources on a given topic, especially related to the laboratory task performed.		[SU1] Assessment of task fulfilment		
	K6_U04		Student can perform basic experiments in a chemical laboratory. He prepares reliable reports on the experiments carried out.		[SU1] Assessment of task fulfilment		

Subject contents	<p>Lecture:</p> <ol style="list-style-type: none">1. Chemical bonds and interactions. Crystals. Colour and photonic crystals.2. Blue paint pigments - their history and present day, types.3. Silicates, Silica aerogels. Natural microsilica structures - diatoms.4. Silicones - genesis, structure, preparation, properties and use.5. Oxygen. Ionic oxides, peroxides and superoxides - structure, properties and use.6. Ozone and its role in troposphere and stratosphere. Acid rain effects.7. Different forms of elements - from mono- to polyatomic species. Phosphorus allotropy.8. Covalent oxides - nitrogen oxides in nature and technology.9. Properties of d- and f-block of elements. Coordination compounds.10. Acids, polyacids and their salts.11. Coordination polymers and MOF's.12. Introduction to supramolecular chemistry.13. Two lectures based on actual science findings and relevant literature data. "Hot" topics. <p>Laboratory experiments (subjects):</p> <ol style="list-style-type: none">1.Redox reactions2.Coordination compounds3.Qualitative analysis of selected ions4.Chemical route to the "nanoworld"5.Acid-base properties of chemical compounds6.Selected aspects of crystallization																	
Prerequisites and co-requisites	"General and Inorganic Chemistry" sem I and "Basics of Organic and Physical Chemistry" sem II, passed																	
Assessment methods and criteria	<table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>lecture: written test</td><td>60.0%</td><td>50.0%</td></tr><tr><td>introductory tests and detailed reports</td><td>50.0%</td><td>50.0%</td></tr></table>			Subject passing criteria	Passing threshold	Percentage of the final grade	lecture: written test	60.0%	50.0%	introductory tests and detailed reports	50.0%	50.0%						
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Example issues/ example questions/ tasks being completed	<p>Lecture test - selected examples:</p> <ol style="list-style-type: none">1. Give the electronic configuration of O₂²⁻ using LCAO method.2. Explain the influence of Si/Al ratio on properties of zeolites.3. What is the role of chlorine in the ozone hole formation?4. Helium - its sources and use.5. What is the ozone role in the troposphere (the layer close to the earth surface)?6. Which elements form covalent oxides? How these oxides usually react with water?7. Characterize silicates.8. Describe the properties and use of a selected nitrogen oxide.9. Why there is one type of ZnCl₂(NH₃)₂ and two types of PtCl₂(NH₃)₂? <p>Short laboratory test questions are closely related to the appropriate exercise topics.</p>																	
Work placement	Not applicable																	