



Subject card

Subject name and code	Glass and ceramic materials, PG_00048226						
Field of study	Chemistry						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			2.0		
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	dr hab. Katarzyna Kazmierczuk					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30		5.0		15.0	50
Subject objectives	Provide students with basic knowledge about the composition, structure, production and application of ceramics and glasses. Developing students' skills in solving simple problems related to the production and selection of ceramic materials.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	K6_W03						
	[K6_W05] knows and understands the chemical processes and algorithms of mathematical models which are necessary for the design of technological processes, knows chemical structure of contemporary materials and its relation to their properties, enabling the selection of the materials for sustainable development technology and material-efficient and energy-efficient methods		The student has knowledge of the processes of obtaining glass and ceramic materials and their selection according to a specific application.			[SW1] Assessment of factual knowledge	
[K6_U01] knows how to get information from literature, databases and other sources, can integrate the information obtained, interpret and critically evaluate it, and draw conclusions, and to formulate and justify the opinions		The student is able to independently obtain information on the manufacture and properties of glass and ceramic materials from literature			[SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment		
Subject contents	Lecture: Introduction to ceramics, comparison with organic polymers and metals. Microstructure of ceramic materials. Structure, properties and preparation of glass. Types of glass. Traditional ceramic raw materials. Construction and preparation of powders. Characteristics of powders. Forming methods. Oxide ceramics and non-oxide ceramics. Ceramic nanomaterials - production, properties. Laboratory: Obtaining glasses by sol-gel method. Obtaining ceramic materials by sintering. Analysis of the obtained materials: FT-IR, AAS. A visit to the Lubiana porcelain factory.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade	
	Test and laboratory report		50.0%			33.0%	
	Test		50.0%			67.0%	
Recommended reading	Basic literature		R. Pampuch, Współczesne materiały ceramiczne, Uczelniane Wyd. Naukowo-Dydaktyczne AGH, Kraków 2005				

	Supplementary literature	. R. Pampuch, K. Hajerko, M. Kordek, Nauka i procesach ceramicznych, Wyd. Naukowe PWN 1992
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. List the types of glass (due to the oxide composition) 2. Discuss the structure and properties of soda-lime and quartz glass 3. What raw materials are included in the glass set, how do these raw materials behave during heating? 4. What can glass be tinted with? 5. What are the ways of forming glass? 6. How is toughened glass made? 7. How are produced and what are the properties of composites: laminated glass, armored glass 8. Discuss the structural types of silicates 9. Discuss the structure of quartz. 10. Discuss the methods of obtaining fused quartz and fused silica and application of these materials 11. Present the sol-gel method of obtaining glassy silica - discuss the substrates, the mechanism of the reaction catalyzed by acids and bases 12. Discuss the preparation and reactivity of orthosilicic acid 13. How mesoporous silica is obtained 14. Discuss the physicochemical properties and reactivity of alumina 15. Present the reactions taking place in the Bayer process of obtaining alumina, 16. What is the sintering process? 17. What is Mullit and how is it obtained 18. What are refractory materials - name examples of refractory materials. 	
Work placement	Not applicable	