



## Subject card

Subject name and code	Analytics of Raw and Construction Materials, PG_00048917						
Field of study	Chemistry in Construction Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2021/2022		
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	4	ECTS credits			6.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Błażej Kudłak					
	Teachers	dr hab. inż. Błażej Kudłak mgr inż. Sławomir Dobrowolski dr inż. Elżbieta Haustein dr hab. inż. Justyna Kucińska-Lipka dr inż. Maciej Sienkiewicz dr inż. Bohdan Dołżycki					
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	15.0	75
	E-learning hours included: 0.0						
	Address on the e-learning platform: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=4627">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=4627</a> Adresy na platformie eNauczanie:						
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	75	5.0	70.0	150		
Subject objectives	Participants of the classes should learn the basic building materials, raw materials, additives, contaminants, wastes. They will apply knowledge of the chemical properties of construction materials to propose analytical procedure for the control of building materials, final products, wastes. Student will know validation protocol. The key analytical techniques used in analysis of building materials and products must be described.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_K03	can predict and present impact of MSc Eng of chemistry activity	[SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice
	K6_U09	Participant can modify existing and design new materials depending on expected properties	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	K6_W08	Participants of the classes should know the basic building materials, raw materials, additives, contaminants, wastes. They will apply knowledge of the chemical properties of construction materials to propose analytical procedure for the control of building materials, final products, wastes. Student will know validation protocol. The key analytical techniques used in analysis of building materials and products must be described.	[SW1] Assessment of factual knowledge
Subject contents	<p>LECTURE Overview lecture Technical analysis in the industry and its scope. Construction materials, raw materials, additives, contaminants, wastes. Types of building materials, their characteristics and chemical properties. Analytical control of raw materials, auxiliary materials, final products, waste materials. Organization of analytic control. Sampling and preparation of a representative sample, and possible sources of error. Evaluation of the validity of the results. Documentation of the analytical laboratory. The analytical methods used in analysis of raw materials and construction products. Spectroscopic analysis. Mass spectrometry. Chromatographic techniques. Speciation. X-ray fluorescence. Polymers for construction chemicals. Analysis of the main component and impurities. Analysis of the air. Analysis of the water. Analysis of the fuel. Analysis of the lubricants. Analysis of steel. Analysis of aggregate, cement and other building materials. Analysis of the wood. Analysis of the glass. Analysis of the asphalt. Analysis of the paints and varnishes. Nanotechnology - an innovative building chemistry. Building Materials in accordance with sustainable development. Ecological solutions. TUTORIALS LABORATORY 1. Quantitative determination of PAH concentrations in mixtures of tar substances emitted during the thermal plasticization of bitumen 2. Analysis of dyes in polymeric materials. 3. Analysis of metal content in cement (white and gray). 4. Analysis of compounds emitted into indoor air: passive dosimetry and dynamic techniques. 5. Determine the type of polymer on the basis of its solubility. 6. Identification and quantitative analysis of the preservative (permetrynu) applied to wood by HPLC. 7. Study the contents of CaO and MgO, CO<sub>2</sub> and moisture in the lime (hydrated, slaked) 8. Determination of residual solvents in the wastewater. 9. A trip to the cement, "Cement Wejherowo" Ltd., Manufacturer of white portland cement. PROJECT SEMINAR 1. The chemical composition of gypsum plaster and newly located and the old. 2. Polymeric materials in water and their impact on the quality of water supplied. 3. Influence of physico-chemical factors on the formation of sustainable and effective waterproofing materials. 4. Bitumen and bitumen in the coatings solvents papowych. 5. Industrial flooring. 6. Binders lime and limestone products in the binder. The role of hydrated lime. 7. Dyes for polymeric materials. 8. Biocides to protect wood. 9. Benefits for humans and the environment arising from the use of steel in construction. 10. Environmental aspects in the design of glass facades 11. The future of concrete in terms of sustainable development. 12. Indoor air pollution in various indoor areas. 13. Passive and dynamic methods used to analyze the volatile pollutants indoors. 14. Chemical analysis of effluent from a cement plant. 15. Air and water pollution (surface and groundwater) emitted as a result of LOTOS in Gdansk. Waste management.</p>		
Prerequisites and co-requisites	Basic knowledge of analytical, inorganic and organic chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Grade from presentation and activity during seminars	60.0%	20.0%
	Laboratory: average from the tests at the beginning of laboratories	60.0%	20.0%
	Lecture: written exam	60.0%	60.0%
Recommended reading	Basic literature	<p>Minczewski J., Marczenko Z.: Chemia analityczna. Podstawy teoretyczne i analiza jakościowa, t. I, Wyd. 8, PWN 2001 Minczewski J., Marczenko Z.: Chemia analityczna. Chemiczne metody analizy, t. II, Wyd.9, PWN 2001 Cygański A.: Chemiczne metody analizy ilościowej, Wyd 5 rozsz., WNT, 1999 Görlich E.: Analiza krzemianów, Wyd. Geologiczne, W-wa 1958 Hulanicki A.: Współczesna chemia analityczna, WNPWN, Warszawa 2001 Namieśnik J., : Przygotowanie próbek środowiskowych do analiz., Wyd. WNT, 2000lectures delivered in the electronic form</p>	

	Supplementary literature	Periodic: "Materiały budowlane" praca zbiorowa pod kier.: prof. dr hab. inż. Bogusława Stefańczyka - Budownictwo ogólne, tom 1, Materiały i wyroby budowlane. Wyd. ARKADY, Warszawa 2005; Małolepszy J., "Materiały budowlane. Podstawy technologii i metody badań (wyd.2 zmienione i poprawione). Publ. AGH ISBN: 9788374641395
	eResources addresses	
Example issues/ example questions/ tasks being completed	see above	
Work placement	Not applicable	