



Subject card

Subject name and code	Process analytics, PG_00045466						
Field of study	Chemical Technology						
Date of commencement of studies	February 2022	Academic year of realisation of subject				2021/2022	
Education level	second-cycle studies	Subject group				Optional subject group 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	1	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					
Lesson type and method of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	15.0	0.0	75
	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	75	10.0		65.0	150	
Subject objectives	The aim of course is giving students knowledge on applicability of using analytical chemistry in widely understood analytics of performing industrial processes.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	K7_U05		can fluently perform numerous analytical techniques including those applicable at sample preparation step			[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	
	K7_K03		can predict and present impact of MSc Eng of chemistry activity			[SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work	
	K7_W04		has knowledge in wide spectrum of analytics and analytical methods			[SW1] Assessment of factual knowledge	
Subject contents	<p>Lectures General issues: Types of measurement signals, measuring range and measurement error, the class of the instrument, the dynamic properties. Selectivity and specificity. Response time and analysis cost. Control of physical and physicochemical properties. Calibration of the instruments. General characteristics of the industrial measurements. Measurements of physical and physicochemical properties of substances (hydrogen ion concentration measurements, density measurements, viscosity measurements).</p> <p>Measurements of chemical composition. Problems of sampling. Representativeness and sample preparation for continuous analysis - examples. Automated processes based on procedural analysis on the example of pH control. Continuous methods of analysis. Gas analysis: dispersive and non-dispersive IR, the use of paramagnetic properties of gases, electrochemical measurements at low and high temperatures, the determination of thermal conductivity of gases, determination of gas density, the use of the chemical properties of gases. Liquid analysis: FIA, determination of viscosity, flash point determination, the determination of liquidity point, atomic absorption. Analysis of solids: X-ray fluorescence. Laboratory Static and dynamic methods of control of indoor air quality Determination of water content in petroleum products by Carl Fischer methods LIRA infrared analyzer of CO Determination of the total sulfur content in petroleum products Auer stationary explosimeter Fluorescent oil analyzer type UP 82_F3 Oxygen analyzer for the water type OXI 149A Servomex magnetodynamic oxygen analyzer type OA 269 Simple gas chromatograph Visit at quality control and process laboratory Seminars Preparation and delivering presentation on process analytics on the base of actual scientific literature</p>						

Prerequisites and co-requisites	Basic knowledge of chemical analysis		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture: written exam	60.0%	60.0%
	Laboratory: average from the tests at the beginning of laboratories	60.0%	20.0%
	Grade from presentation and activity during seminars	60.0%	20.0%
Recommended reading	Basic literature	1. E. Romer, Miernictwo przemysłowe, PWN, Warszawa, 1970 2. M. Trojanowicz, Automatyizacja w analizie chemicznej, WNT, Warszawa, 1972 3. J. Piotrowski (red), Pomiary. Czujniki i metody pomiarowe wybranych wielkości fizycznych i składu chemicznego, WNT, Warszawa, 2009	
	Supplementary literature	P.N. Cheremisinoff, H.J. Perlis, Analytical measurements and instrumentation for process and pollution control, Ann Arbor Science, 1981	
	eResources addresses		
Example issues/ example questions/ tasks being completed	see above		
Work placement	Not applicable		