GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Process analytics, PG_00045466
Field of study	Chemical Technology

Date of commencement of studies	February 2024	Academic year of realisation of subject	2023/2024
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 dr hab. inż. Justyna Kucińska-Lipka dr inż. Maciej Sienkiewicz dr inż. Tomasz Majchrzak

Lesson types and methods 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	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). 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
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, Automatyzacja w analizie chemicznej, WNT, Warszawa, 1972 3. J. Piotrowski (red), Pomiary. Czujniki i metody pomiarowe wybranych wielkosci 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	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	see above
Work placement	Not applicable