GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	PROCESS ANALYTICS, PG_00064302		
Field of study	ANALITYKA PROCESOWA		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Optional subject group Specialty 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	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
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 mgr inż. Przemysław Gnatowski	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	15.0	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	8.0	57.0	125

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_K02] understands the non-technical aspects and implications of graduate activity, including the impact on the environment	Student understands non-technical aspects and results of His/Her actions including impact on environment	[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce [SK4] Ocena umiejętności komunikacji, w tym poprawności językowej [SK3] Ocena umiejętności organizacji pracy [SK2] Ocena postępów pracy [SK1] Ocena umiejętności pracy w grupie
[K7_U04] predicts the properties of the materials obtained and the course of processes involving them, based on knowledge of technology and related fields and computer methods of data analysis, modelling and simulation	student is able to recognize abilities of materials obtained and process run based on knowledge in the area of technology and CAD methods in data analytics, modelling and simulations	[SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania [SU4] Ocena umiejętności korzystania z metod i narzędzi [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU2] Ocena umiejętności analizy informacji [SU1] Ocena realizacji zadania
[K7_W04] recognises scientific, technological, organisational and economic opportunities and constraints in technology and related fields	Student is able, based on knowledge gained, to recognize abilities in research, scientific, technological, organizational, economic area of technology and related fileds of science	[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym [SW1] Ocena wiedzy faktograficznej

Subject contents

Course content – lecture
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. hybrid form of performing classes

Course content – laboratory
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 thermoparamagnetic oxygen analyser, Simple gas chromatograph Visit at quality control and process laboratory Asphalts and emulsions in hydroisolation applications hybrid form of performing classes

Course content – project
Preparing projectof selecting detectors and analysers of flamable and explosive gases in selected refining units based on actual scientific literature; hybrid form of performing classes

Prerequisites and co-requisites

Basic knowledge of chemical analysis

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Grade from presentation of project 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	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	

Example issues/ example questions/ tasks being completed

see above

Practical activites within the subject

Not applicable

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