



Subject card

Subject name and code	Industrial analytics , PG_00038543						
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			5.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Justyna Płotka-Wasyłka					
	Teachers	dr hab. inż. Justyna Płotka-Wasyłka dr inż. Tomasz Dymerski dr hab. inż. Mariusz Marć prof. dr hab. inż. Andrzej Wasik dr inż. Małgorzata Rutkowska dr inż. Tomasz Majchrzak prof. dr hab. inż. Żaneta Polkowska dr inż. Bartłomiej Cieślik dr inż. Weronika Hewelt-Belka					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	60.0	0.0	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	5.0		45.0	125	
Subject objectives	The main goal of studies is to achieve the knowledge and practical experience in the field of: - samples pretreatment;- separation methods with particular regard to chromatographic techniques;- quantitative determination;- calculation of results of quantitative analysis using mathematics methods and its statistical evaluation;- methods validation (reference materials, interlaboratory comparison, sources of errors, estimation of systematic error); - problems related to transferring aspects of laboratory analysis to an industrial scale.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_U05	Student is able to solve analytical problems using elemental analysis of organic compounds; is able to apply proper separation techniques with particular emphasis on chromatographic techniques			[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools		
	K7_K03	The student is able to interact and work in a group, assuming various roles in it. Is able to properly define the priorities for the implementation of the task set by himself or others			[SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	During the course, the application of basic and advanced analytical techniques will be presented, i.e. elemental analysis, GC, LC, extraction techniques, etc. to solve industrial problems. Industrial analytics problems and ways to solve them will be presented. The lectures will include content presented by invited people working in industry (issues related to the nature of their laboratories, cooperation with analytical laboratories, challenges of transferring the micro scale to the macro scale, obtaining financial commitments from various sources to implement research goals related to industrial units). The classes will include presenting problems (case studies) and methods of solving them.		
Prerequisites and co-requisites	Passed subjects: Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Physics, Analytical Chemistry. Basic knowledge of analytical chemistry. The basic knowledge of analytical chemistry, inorganic chemistry and organic chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture: exams and short tests	60.0%	50.0%
	Laboratory: tests and reports	60.0%	50.0%
Recommended reading	<p>Basic literature</p> <ol style="list-style-type: none"> 1 J. Minczewski, Z. Marczenko, Chemia analityczna, tom 3, wyd. 9 i 10, zm., PWN, Warszawa 2005. 2 D.A. Skoog, D.M. West, J.F. Holler, S.R.Crouch, Fundamentals of Analytical Chemistry, (VII ed.), Saunders College Publishing, Philadelphia 1996, Podstawy Chemii Analitycznej, t. 1-2, PWN, Warszawa 2006. 3 P. Konieczka P., Namieśnik J., Zygmunt B., Bulska E., Świtaj-Zawadka A., Naganowska A., Kremer E., Rompa M., Ocena i kontrola jakości wyników pomiarów analitycznych, WN-T, Warszawa 2007. 4 Fizykochemiczne metody kontroli zanieczyszczeń środowiska, [red.] J. Namieśnik i Z. Jamrógiewicz, WN-T, Warszawa 1998. 5 A. Cygański, Metody spektroskopowe w chemii analitycznej, WN-T, Warszawa 1993. 6 N.S. Połuektow, Analiza metodą fotometrii płomieniowej, WN-T, Warszawa 1969. 7 M. Pinta, Absorpcyjna spektrometria atomowa. Zastosowania w chemii analitycznej, PWN, Warszawa 1977. 8 Z. Marczenko, Spektrofotometryczne oznaczanie pierwiastków, PWN, Warszawa 1979. 9 A. Cygański, Metody elektroanalityczne, WN-T, Warszawa 1995. 10 Z. Witkiewicz, Podstawy chromatografii, WN-T, Warszawa 2000. 11 Z Witkiewicz, J. Hetper, Chromatografia gazowa, WN-T, Warszawa 2001. 12 B. Bobrański, Analiza ilościowa związków organicznych, PWN, Warszawa 1979. 13 Chromatografia cieczowa, [red.] M. Kamiński, CEEAM, Gdańsk 2004. 14 Spektrometria atomowa, [red.] E. Bulska, K. Pyrzyńska, Malmut, Warszawa 2007. 		

	Supplementary literature	<p>1 M. Jarosz, E. Malinowska, Pracownia chemiczna. Analiza instrumentalna, wyd. 2 uzup., WSiP, Warszawa 1999.</p> <p>2 W. Szczepaniak, Metody instrumentalne w analizie chemicznej, PWN, Warszawa 1999.</p> <p>3 K. Danzer, E. Than, D. Moloch, Analityka. Przegląd systematyczny, WN-T, Warszawa 1993.</p> <p>4 J. Czermiński i współautorzy, Metody statystyczne dla chemików, PWN, Warszawa 1986.</p> <p>5 G.W. Ewing, Metody instrumentalne w analizie chemicznej, PWN, Warszawa 1980.</p> <p>6 T.H. Gow, Nowoczesne metody instrumentalne analizy, WN-T, Warszawa 1976.</p> <p>7 H.W. Willard, L.L. Merritt, J.A. Dean, F.A. Settle, Instrumental Methods of Analysis, Wadsworth, Belmont 1981.</p> <p>8 Z. Marczenko, Spektrofotometryczne oznaczanie pierwiastków, PWN, Warszawa 1979.</p> <p>9 A. Cygański, Metody elektroanalizy, WN-T, Warszawa 1995.</p> <p>10 Z. Galus, Teoretyczne podstawy elektroanalizy chemicznej, PWN, Warszawa 1977.</p> <p>11 Metody analitycznej spektrometrii atomowej, [red.] W. Żywnicki, J. Borkowska-Burnecka, E. Bulska, E. Szmyd, Malmut, Warszawa 2010.</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Describe the problems encountered by an analytical chemist in an industrial laboratory. Present methods for solving them. Discuss the analytical procedure for determining selected metals in samples after incineration of industrial waste. Discuss issues related to indoor air analysis. Discuss issues related to overcoming barriers to cooperation between university and industrial units	
Work placement	Not applicable	