



## Subject card

Subject name and code	Thesis laboratory, PG_00052336						
Field of study	Chemical Technology						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2023/2024		
Education level	first-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	4		Language of instruction		Polish Applications used to operate the equipment and much of the literature are available only in English		
Semester of study	7		ECTS credits		3.0		
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 inż. Bartłomiej Cieślík				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	60.0	0.0	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		5.0		10.0	75
Subject objectives	The aim of the course is to become familiar with methods of conducting scientific research and using research as part of access to a diploma thesis						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U02		The student is able to operate the equipment necessary to conduct the planned diploma research		[SU1] Assessment of task fulfilment		
	K6_U11		The student is able to plan the course of scientific research		[SU2] Assessment of ability to analyse information		
	K6_U12		The student knows the occupational health and safety rules applicable in the laboratory where diploma theses are conducted		[SU3] Assessment of ability to use knowledge gained from the subject		
Subject contents	As part of the course, the student and the supervisor plan the course of scientific research, taking into account such information as the type of samples tested, the need to carry out sample preparation procedures, calibration of equipment and formal analysis. After identifying possible difficulties, the student begins to conduct research. After preparing the samples and equipment, he carries out the tests under the supervision of the supervisor, making sure that all occupational health and safety rules are observed during the tests. After collecting the data, the student prepares them using appropriate statistical tests in order to draw constructive conclusions based on the analysis of the research results.						
Prerequisites and co-requisites	The student must have basic knowledge of spectrometry and be able to use the statistical tools necessary to prepare a wide set of data						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Assessment of the diploma thesis and preparation of results		60.0%		60.0%		
	Assessment of laboratory work		60.0%		40.0%		

Recommended reading	Basic literature	<p>Cieślík, B.M., Świerczek, L., Konieczka, P., 2018. Analytical and legislative challenges of sewage sludge processing and management. Monatshefte für Chemie - Chem. Mon. 149, 16351645. <a href="https://doi.org/10.1007/s00706-018-2255-2">https://doi.org/10.1007/s00706-018-2255-2</a></p> <p>Świerczek, L., Cieślík, B.M., Konieczka, P., 2021. Challenges and opportunities related to the use of sewage sludge ash in cement-based building materials A review. J. Clean. Prod. 287. <a href="https://doi.org/10.1016/j.jclepro.2020.125054">https://doi.org/10.1016/j.jclepro.2020.125054</a></p> <p>Świerczek, L., Cieślík, B.M., Konieczka, P., 2018. The potential of raw sewage sludge in construction industry A review. J. Clean. Prod. 200, 342356. <a href="https://doi.org/10.1016/j.jclepro.2018.07.188">https://doi.org/10.1016/j.jclepro.2018.07.188</a></p>
	Supplementary literature	<p>Cieślík, B., Konieczka, P., 2017. A review of phosphorus recovery methods at various steps of wastewater treatment and sewage sludge management. The concept of no solid waste generation and analytical methods. J. Clean. Prod. <a href="https://doi.org/10.1016/j.jclepro.2016.11.116">https://doi.org/10.1016/j.jclepro.2016.11.116</a></p> <p>Cieślík, B.M., Namieśnik, J., Konieczka, P., 2015. Review of sewage sludge management: Standards, regulations and analytical methods. J. Clean. Prod. 90, 115. <a href="https://doi.org/10.1016/j.jclepro.2014.11.031">https://doi.org/10.1016/j.jclepro.2014.11.031</a></p> <p>Cieślík, B.M., Zając, M., Gałuszka, A., Konieczka, P., 2018. Comprehensive stabilization of all streams of solid residues formed during sewage sludge thermal treatment Case study. J. Clean. Prod. 178, 757767. <a href="https://doi.org/10.1016/j.jclepro.2018.01.069">https://doi.org/10.1016/j.jclepro.2018.01.069</a></p>
	eResources addresses	<p>Podstawowe  <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=14893">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=14893</a> - The eNauczanie course describes several tips to facilitate the completion of your diploma thesis.          Adresy na platformie eNauczanie:</p>
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> <li>- Preparation of samples after their mineralization</li> <li>- Calibration of various types of spectrometers</li> <li>- - Statistical assessment of the results</li> </ul>	
Work placement	Not applicable	