



Subject card

Subject name and code	DIPLOMA LABORATORY, PG_00048907						
Field of study	Biotechnology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish polish		
Semester of study	4	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department Of Chemistry Technology And Biotechnology Of Food -> Faculty Of Chemistry -> Wydział Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Robert Tylingo					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	75.0	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		10.0		40.0	125
Subject objectives	The aim of the "Diploma Laboratory" subject is to develop practical research skills through independent implementation of the experimental part of the Master's thesis. The student improves competences in planning, conducting and documenting experiments, analyzing results and using modern research methods and equipment. The subject also aims to prepare the student to work in accordance with the principles of good laboratory practice, bioethics and protection of intellectual property, with particular emphasis on biotechnological aspects of the research project.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U09] is able to design experiments and analyze experimental results, is able to prepare and present papers, reports, documentation of experiments, technological processes using correct scientific and specialist terminology, and to prepare a correct bibliography	The student will gain the ability to independently design and conduct laboratory experiments related to the topic of the diploma thesis. The student will be able to develop a research methodology, collect and analyze data, and draw conclusions based on the obtained results. The student will learn to prepare reports and documentation of experiments using correct scientific and specialist terminology and create a correct bibliography in accordance with applicable citation standards.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
	[K7_K01] has a sense of the importance of attitudes such as responsibility, goal-directedness and conscientiousness in one's work	The student will develop an awareness of the importance of responsibility, diligence, and perseverance in achieving goals during the implementation of research tasks within the diploma laboratory. The student will cultivate independence and reliability in conducting laboratory experiments, documenting results, and adhering to the principles of good laboratory practice and research ethics.	[SK3] Assessment of ability to organize work [SK2] Assessment of progress of work [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice
	[K7_U06] is able to apply statistical methods, computer solutions, especially bioinformatics methods to design experiments and technologies, analyze experimental results and technological processes and solve and technological processes and solve problems in the field of biotechnology, is able to use biotechnological databases	The student will acquire the ability to use statistical methods and IT tools, including bioinformatics techniques, in designing experiments and analyzing data obtained during laboratory research. They will be able to interpret results using appropriate analytical software and effectively utilize biotechnological databases to support research processes and solve problems related to biotechnology and biological data analysis.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	[K7_K04] is aware of the need to solve problems and perform tasks, independently formulate questions to solve a given problem or task; is able to plan the execution of a larger task by dividing it into partial tasks and draw up an appropriate schedule	The student will develop an awareness of the importance of solving research problems and carrying out complex laboratory tasks in an organized and thoughtful manner. They will acquire the ability to independently formulate research questions and to plan the implementation of a long-term experimental project by dividing it into logical stages and preparing a detailed work schedule	[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work [SK1] Assessment of group work skills
	[K7_W09] knows the concepts and principles of intellectual property protection and patent protection, bioethical problems and major legal regulations in the field of bioethics, the principles of experimental design and analysis of experimental results	The student will gain knowledge on the protection of intellectual and industrial property, including the principles of patent protection of research results conducted in the laboratory. He will learn the basic concepts and legal regulations in the field of bioethics and ethical aspects of conducting biotechnological research. He will understand the principles of proper design of experiments and analysis and interpretation of results in accordance with applicable scientific and legal standards.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

Subject contents	<p>Organization and planning of research work: defining research objectives, hypotheses, project scope, and preparation of a work schedule.</p> <p>Independent execution of laboratory experiments: sample preparation, measurements, observations, and documentation of results.</p> <p>Application of analytical and instrumental methods: use of available research equipment according to the thesis topic.</p> <p>Analysis and interpretation of experimental results: data processing, application of statistical methods and bioinformatics tools.</p> <p>Use of scientific literature and databases: information retrieval, source analysis, processing of data from biotechnological and patent databases.</p> <p>Preparation for the diploma thesis: collection of materials for the experimental section, formulation of conclusions.</p>								
Prerequisites and co-requisites	<p>The student should have:</p> <ol style="list-style-type: none"> Theoretical and practical knowledge in biotechnology, chemistry, molecular biology, and bioprocess technology necessary to conduct research work. Laboratory experience in working with biological and chemical materials, gained during previous practical courses. Understanding of experimental design and data analysis, including the ability to apply basic statistical methods. 								
Assessment methods and criteria	<table border="1" data-bbox="448 1106 1485 1178"> <thead> <tr> <th data-bbox="448 1106 799 1137">Subject passing criteria</th> <th data-bbox="804 1106 1139 1137">Passing threshold</th> <th data-bbox="1144 1106 1485 1137">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1144 799 1178">Evaluation of the research report</td> <td data-bbox="804 1144 1139 1178">60.0%</td> <td data-bbox="1144 1144 1485 1178">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Evaluation of the research report	60.0%	100.0%
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Evaluation of the research report	60.0%	100.0%							
Recommended reading	Basic literature	<p>Sęk, H. (red.) <i>Redagowanie prac dyplomowych i naukowych</i> Warszawa: Wydawnictwo Naukowe PWN</p> <p>Walczak, B. <i>Metody analizy danych w chemometrii</i> Warszawa: PWN</p> <p>Berg, J. M., Tymoczko, J. L., Gatto, G. J., Stryer, L. <i>Biochemia</i> Warszawa: Wydawnictwo Naukowe PWN</p> <p>Ratner, B. D., Hoffman, A. S., Schoen, F. J., Lemons, J. E. (red.) <i>Biomaterials Science: An Introduction to Materials in Medicine</i> Elsevier Academic Press</p>							
	Supplementary literature	-							
	eResources addresses	<p>Adresy na platformie eNauczenie: LABORATORIUM DYPLOMOWE - Moodle ID: 45922 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=45922</p>							

<p>Example issues/ example questions/ tasks being completed</p>	<p>How to plan a biotechnological experiment in accordance with Good Laboratory Practice (GLP) principles?</p> <p>Which statistical methods are appropriate for analyzing data obtained in biological experiments?</p> <p>How to properly document research activities according to GLP standards?</p> <p>Independent execution of laboratory experiments related to the master's thesis topic.</p> <p>Analysis of results using statistical and bioinformatics software.</p> <p>Evaluation of data reliability and formulation of conclusions based on obtained results.</p> <p>Preparation of a research report and materials for diploma thesis documentation.</p>
<p>Work placement</p>	<p>Not applicable</p>

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