

Course title Laboratorium zaawansowanej chemii – mikrobiologia/Advanced chemistry laboratory - microbiology		ECTS code 13.3.0406	
Name of unit administrating study Faculty of Chemistry			
Studies			
Field of study	Type	Form	
Chemistry	Master	Full-time studies	
Dr inż. Joanna Jeżewska-Fraćkowiak			
Forms of classes, the realization and number of hours		ECTS credits	
A. Forms of classes, in accordance with the UG Rector's regulations Laboratory classes		classes 20 h tutorial classes 5 h student's own work 25 h TOTAL: 50 h - 2 ECTS	
B. The realization of activities In-class learning			
Number of hours Laboratory classes 20 h			
The academic cycle 2019/2020 winter semester			
Type of course obligatory		Language of instruction Polish	
Teaching methods <ul style="list-style-type: none"> • work in groups • Analysis and development of experimental results and preparation of a written abstract. • Laboratory experiments • Designing chemical experiments 		Form and method of assessment and basic criteria for evaluation or examination requirements	
		A. Final evaluation, in accordance with the UG study regulations Course completion (with a grade)	
		C. Assessment methods Performing given laboratory tasks and their documentation, open questions test Completing the given laboratory task- practical part Completing the given check test- theoretical part	
		C. The basic criteria for evaluation or exam requirements The following aspects contribute to the final grade: 1. Written test 2. Assessment of the abstract and graphical abstract, prepared on the basis of laboratory tasks results. 3. Assessment of the laboratory schedule prepared by the students team. Additional term of written test for the students, who didn't achieve 51% of possible assessment points. Final grade consistent with the scale given in UG Study Regulations	

Required courses and introductory requirements	
none	
Aims of education	
<ol style="list-style-type: none"> 1. Presenting GLP rules and laboratory safety instructions for the microbiology lab. 2. Presenting techniques for the bacterial lysate preparation. 3. Presenting chromatography separation of cellular proteins on the ion exchange media in micro scale. 4. Presenting the electrophoretic separation method for the chromatography fractions of bacterial cell proteins. 5. Practicing the skill of independent experimental work and solving problems, arising in the course of conducting microbiological and chemical experiments. 6. Practicing the skill of team work and rational tasks division, also preparing the schedule of works to complete, which involves subsequent lab meetings. 	
Course contents	
<ul style="list-style-type: none"> • GLP and lab safety in microbiology/biotechnology lab • cell proteins functions • protein isolation and three stage purification strategy from the cell sources • cell lysis methods • ion exchange chromatographic separation • SDS-PAGE electrophoretic separation <ul style="list-style-type: none"> • Performing the project, involving protein extraction from <i>Escherichia coli</i> cells, ion exchange media separation of isolated proteins, followed by quantitative (spectrophotometric) and qualitative (SDS-PAGE electrophoresis) analysis. Graphical and critical description of the obtained results in the form of abstract and graphical abstract. 	
Bibliography of literature	
<p>A. Literature required to pass the course</p> <ol style="list-style-type: none"> 1. Ciepiela A.P. Ćwiczenia z biologii molekularnej. Kozak Druk S.C., Siedlce 2005 (str. 15-20, 29-33, 80-88). 2. Stepnowski P. i wsp. Techniki separacyjne. Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2010 3. Stryer L.: Biochemia, PWN, 1999. 4. http://www.gelifesciences.com 5. Green M.R., Sambrook J. Molecular Cloning. A Laboratory Manual. Cold Spring Harbor Laboratory Press, New York, 2012. 6. Scopes, R.K. Protein purification, principles and practice. 2nd Ed. Springer Verlag, New York, 1987. 7. Eienthal, R., Danson, M.J. Enzyme Assays. IRL Press, Oxford University Press, 1993. <p>B. Extracurricular readings</p>	
Knowledge	
<ol style="list-style-type: none"> 1. Students know GLP and lab safety rules in the microbiology lab. 2. Students know procedures of isolation and three stage purification of proteins from the cellular source. 4. Students know and differentiate methods of bacterial cell lysis, basing on their mechanisms. 5. Students know the principles of protein separation in ion exchange chromatography. 6. Students know the principles of protein separation during the 	

polyacrylamide gel electrophoresis SDS-PAGE.

7. Students know the rules of preparing the scientific abstract, based on the experimental data.

Skills

1. Students prepare the laboratory place and the equipment for microbiological work. Students prepare the laboratory tasks schedule, involving the subsequent meetings and divide the tasks among team members.
2. Students perform chemical calculations, essential for conducting the microbiology experiments.
3. Students perform bacterial cell lysis.
5. Students perform the separation of soluble and insoluble bacterial cell proteins.
6. Students separate obtained bacterial proteins, using preparative ion exchange chromatography.
7. Students perform polyacrylamide gel electrophoretic (SDS-PAGE) separation of obtained protein fractions.
8. Students rationally plan the schedule of performed experiments.
9. Students discuss the experimental problems, applying the adequate scientific vocabulary.
10. Students prepare the experimental results in the form of abstract and graphical abstract, drawing graphs and filling in the tables.

Social competence

1. Students understand need of further education.
2. When preparing a conclusive statement- blend interdisciplinary knowledge from the different fields.
3. Show creativeness in the individual and team work, divide tasks and exact their performance.
4. Follow the rules of work with microorganisms.
5. Pay attention and work with extra care while handling the chemical substances and biological material.