none





Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego



	narodowa strategia spójności		ecznego	u FUNDUSZ SPOŁECZNY	* * * *	
Course title				ECTS code		
Advanced chemistry laboratory - microbiology				13.3.0406		
Name of unit admi						
null						
Studies						
fo outto	field of otyals	4 a	drugiogo eter	nnia		
faculty Wydział Chemii	field of study Chemia		type drugiego stopnia form stacjonarne			
, , , , , ,	specialty chemia biomedyczna, analityka i diagnostyka chem			nemiczna, chemia i		
				środowiska, chemia obliczeniowa		
		specialization	wszystkie			
Teaching staff						
dr Joanna Jeżew	rska-Frackowiak; dr Daria Kref	ft: dr Joanna Żeb	rowska			
	the realization and number	•	ECTS credits			
Forms of classes				2		
Laboratory classes				classes 20 h		
The realization of activities				tutorial classes 5 h		
classroom instruction				student's own work 25 h		
Number of hours				TOTAL: 50 h - 2 ECTS		
Laboratory classe						
The academic cyc						
2022/2023 winter	r semester					
Type of course	Languag	Language of instruction				
obligatory	-	polish				
Teaching methods		Form and method of assessment and basic criteria for eveluation or examination requirements				
<ul> <li>Analysis and de</li> </ul>	sulto i	Final evaluation				
and preparation	Grade	Graded credit				
- conducting expe		Assessment methods				
- designing exper		- (mid-term / end-term) test				
- group work	`	- assignment work – project or presentation				
		1			al assignment	
		<ul> <li>- assignment work – completing a specific practical assignment</li> <li>- Performing given laboratory tasks and their documentation, open</li> </ul>				
			tions test	laboratory tacks and their acce	monation, open	
				iven laboratory task- practical p	part	
				iven check test- theoretical part		
				or evaluation		
		The follow	ing aspects co	ontribute to the final grade:		
		1. Written	• .	J		
		2. Assessr	ment of the ab	stract and graphical abstract, prepa	ared on the basis of	
		1	tasks results.			
				poratory schedule prepared by the s		
		Additional		n test for the students, who didn't ac	nileve 5 1% of possible	
			•	rith the scale given in UG Study Reg	gulations	
Method of verifyin	g required learning outcome					
	and introductory requireme					
A. Formal requirem		nts				

### Laboratorium zaawansowanej chemii - mikrobiologia #13.3.0406

Sylabusy - Centrum Informatyczne UG Dział Kształcenia



#### **B. Prerequisites**

none

#### Aims of education

- 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 susbsequent lab meetings.

#### **Course contents**

- · 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
- · Performing the project, involving protein extraction from Escherichia coli 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

Literature required to pass the course

- 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. IRL Press, Oxford University Press, 1993.

Extracurricular readings

## The learning outcomes (for the field of study and specialization)

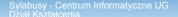
#### Knowledge

- 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 disscuss 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.

# Laboratorium zaawansowanej chemii - mikrobiologia #13.3.0406 Sylabusy - Centrum Informatyczne UG Dział Kształcenia





	Social competence
	<ol> <li>Students understand need of further education.</li> <li>When preparing a conclusive statement- blend interdisciplinary knowledge from the different fields.</li> <li>Show creativeness in the individual and team work, divide tasks and exact their performance.</li> <li>Follow the rules of work with microorganisms.</li> <li>Pay attention and work with extra care while handling the chemical substances and biological material.</li> </ol>
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