GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modern Methods and Apparatus in Microbiology and Biotechnology, PG_00036745		
Field of study	Biotechnology		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Rafał Piątek	
	Teachers	dr hab. inż. Rafał Piątek dr hab. inż. Marta Wanarska dr Rafał Płatek	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30	2.0	18.0	50

Subject objectives	The aim of the course is to theoretically and practically familiarize students with modern methods used in microbiology, biotechnology, molecular biology and their use in science, industry and medicine.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W08	The student becomes familiar with selected modern techniques used in microbiology, biotechnology and molecular biology, e.g. plasmon resonance, calorimetry, spectroscopy - various types, nucleic acid sequencing, recombinant proteins - construction and production, CRISPR, siRNA. The student becomes familiar with the potential of these methods in various fields of biotechnology and medicine and is aware of their limitations.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	K6_W09	The student has theoretical knowledge of the basic analytical and chromatographic techniques used in biotechnology and microbiology. The student knows what practical applications have modern analytical and chromatographic methods in biotechnology and microbiology.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
	K6_U04	The student has the ability to use basic microbiological techniques and methods, eg ELISA technique, PCR technique, immunofluorescence microscopy.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	K6_U06	The student learns basic and advanced techniques used in microbiology, biotechnology and molecular biology. During the course, the student learns techniques such as: PCR technique, FPLC chromatography, immunodetection, electrophoresis, spectroscopy.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	K6_K02	The student is aware of the limitations resulting from incomplete knowledge in the field of modern biotechnology. The student is aware of the need to update his knowledge in the field of techniques used in biotechnology.	[SK1] Assessment of group work skills [SK2] Assessment of progress of work [SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice

<table>
<tr><td>Subject contents</td><td>Lectures:

Physical methods:

1. Analysis of equilibrium processes in biotechnology, microbiology and chemistry of biomacromolecules.

2. DSC microcalorimetry in biotechnology and identification of microorganisms.

3. Fluometric methods in biotechnology and microbiology.

4. Surface plasmon resonance.

Methods and techniques based on the use of processes taking place in cells.

5. Fusion proteins, chimeric proteins, fusion peptide domains.

6. Gene silencing methods based on the phenomenon of RNA interference.

7. Gene silencing methods based on the CRISPR technique.

8. DNA sequencing - classical methods. 9. DNA sequencing - NGS methods.

Laboratories:

1. Spectroscopic methods and equilibrium analysis.
2. Analytical gel chromatography of proteins - standard curve and molecular weight determination.
3. PCR technique - DNA amplification.
4. Application of qPCR technique.
5. Tissue immunostaining and confocal microscopy.
6. Methods of counting bacteria.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Laboratory evaluation.</td><td>60.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>Materials are provided by the teacher.</td></tr><tr><td>Supplementary literature</td><td>No need.</td></tr><tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Nowoczesne Metody i Aparatura w Mikrobiologii i Biotechnologii - laboratorium i wykład - Moodle ID: 26674
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26674</td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>PCR technique - familiarization with problems related to sample preparation for PCR reaction.

qPCR technique - familiarization with quantitative PCR.

Molecular filtration - familiarization with analytical use of chromatographic technique.

Microscopy and fluorescence spectroscopy - scope of information provided by both methods.

Bacterial counting - drawing attention to various limitations related to using different methods in analysis of the same issue.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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