

Subject card

Subject name and code	Introduction to biotechnology - mathematics, physics, chemistry Methodology (M01_B2), PG_00153655						
Field of study	Biotechnology						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	undergraduate studies	Subject group					
Mode of study	full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			8.0		
Learning profile	academic	Assessment form					
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Stanisław Oldziej					
	Teachers	dr hab. Stanisław Oldziej dr hab. Agnieszka Chylewska dr Marta Orlikowska dr Jacek Tryba dr Julia Witkowska dr hab. Rafał Dutkiewicz dr hab. Szymon Ziętkiewicz mgr inż. Paulina Nowicka dr Mateusz Kowalik dr Aleksandra Nowel dr Maria Dzierżyńska dr hab. Piotr Szuca dr inż. Irena Bylińska dr Ewa Wiczerzak mgr Aleksandra Ciesielska					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	61.0	38.0	0.0	0.0	99
	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	99	30.0	75.0	204		
Subject objectives	Establish the basic knowledge of chemistry, mathematics and physics necessary to understand and describe biological phenomena. The student will also become familiar with basic mathematical and statistical methods used to describe and analyze basic chemical and physical processes occurring in living organisms						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BIOTECHL3_U03] The graduate is able to use basic mathematical and statistical methods to describe phenomena and analyse data; analyse basic data in professional databases used in biotechnology	he student will become familiar with basic mathematical and statistical methods used to describe and analyze basic chemical and physical processes occurring in living organisms	[SU4] test/exam - oral or written
	[BIOTECHL3_W06] The graduate knows and understands basic knowledge in science and natural sciences necessary for understanding the phenomena and biological processes, particular cellular processes at the molecular level	Establish the basic knowledge of chemistry, mathematics and physics necessary to understand and describe biological phenomena	[SW4] test/exam - oral or written
Subject contents	<p>M1.</p> <p>Practical laboratory work skills combined with basic chemical calculations: Discussion of the principles of safe laboratory work and familiarization with Safety Data Sheets (SDS). Description of basic laboratory equipment, equipment and laboratory glassware and their uses. Chemical calculations: calculation of solution concentrations (molar, percentage), dilution of solutions, conversion of concentrations. Preparation of solutions of specific concentrations from tureens and base solutions and working with strong acids and bases. Methods of determining pH (indicators, pH-metric measurement). Protolysis of salt solutions. Buffer solutions: preparation, pH measurement and buffer capacity testing. Laboratory notes: principles of keeping accurate records and recording experimental results.</p> <p>M2. (Bioorganic Chemistry)</p> <p>Electron configuration, chemical bonding, hybridization, Lewis structures, resonance structures, Concept of acidity/alkalinity in organic chemistry, Isomerism: constitutional, geometric, configurational, conformational, Groups of organic compounds, their nomenclature and properties, Basic mechanisms in organic chemistry (nucleophilic, electrophilic and free radical substitution, nucleophilic and electrophilic addition, elimination), Properties and reactions of alcohols and thiols - Properties and reactions of aldehydes and ketones, Properties and reactions of carboxylic acids and their derivatives, Properties and reactions of aliphatic, aromatic, heterocyclic amines</p> <p>M3. (Mathematics)</p> <p>Continues (number e), Overview of elementary functions (inverse function), Limit and continuity of functions, properties of continuous functions, differentiation of functions, applications of the derivative, Indeterminate integral of a function, basic methods of integration, Definite and improper integral, applications of integration</p> <p>M4. (Elements of Biophysics)</p> <p>Introduction to data handling and presentation: measurement data, error, significant figures. graphs, calibration curves, equation of a straight line, linearization of graphs. - Ionizing radiation, activity, decay period, doses; measurement and units. - Sedimentation methods, centrifugation. Viscosity, Sedimentation methods, centrifugation to equilibrium in cesium chloride density gradient, Viscosity coefficient of liquids using Stokes method. - Study of radiative penetration.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Part M4	0.0%	30.0%
	Part M3	0.0%	30.0%
	Part M2	0.0%	30.0%
	Part M1	0.0%	10.0%

Recommended reading	Basic literature	G. Kwiecińska, Matematyka, cz. I, II i III, Wydawnictwo UG, 2001 Z. Galus - Ćwiczenia rachunkowe z chemii analitycznej John McMurry Chemia organiczna, Wydawnictwo Naukowe PWN Paula Yurkanis Bruice Organic chemistry, Pearson Education Limited Skrypt "Biofizyka z elementami fizyki" S. Ziętkiewicz
	Supplementary literature	G. M. Fichtenholz, Rachunek różniczkowy i całkowy, t. 1, 2 i 3, PWN, 1985
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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