GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Biophysics of Macromolecules, PG_00058239		
Field of study	Biotechnology		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Optional subject group 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	1	Language of instruction	Polish Polish but some materials in English
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Pharmaceutical Technology and Biochemistry -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Maciej Bagiński	
	Teachers	prof. dr hab. inż. Maciej Bagiński	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	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	1.0	19.0	50

Subject objectives

Lecture content includes the definition, structure, operation and molecular biophysics of various macromolecular systems and cellular macrosystems. The lecture will also present various biophysical methods for studying such systems and their practical aspects. Thanks to such methods, we can learn and understand the operation of macromolecules and macrosystems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W02] has advanced knowledge of structure and activity of enzymes and biologically active compounds also in pharmacological context, knows basic instrumental methods of qualitative and quantitative analysis and activity studies of biomolecules	The student has knowledge of the structure and functioning of macromolecules such as proteins, nucleic acids, membranes and polysugars. He also has knowledge of biophysical methods for studying macromolecular and subcellular systems.	[SW1] Assessment of factual knowledge
[K7_U04] is able to predict potential properties of biomolecules and biologically active compounds on the basis of knowledge of their chemical structure and apply methods of molecular modelling of biomolecules	The student is able to predict the properties of macromolecules and their biological functions. Can find relationships between structure and these properties. Understands the basics of molecular modeling.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
[K7_K02] is aware of the limitations and the necessity of continuous development of knowledge and technology; understands the need for education and constant training	The student understands the contemporary challenges of studying biophysical macromolecular systems and knows the limitations of the methods and the need for continuous education in this area.	[SK2] Assessment of progress of work

Subject contents	1. Introduction. Basic definitions and origins of macrosystems biophysics. 2. The structure of macromolecules and macrosystems. 3. Biophysical/structural methods for studying the structure of macromolecules. 4. Important interactions in macromolecular systems. 5. Biophysics of proteins and their complexes. 6. Biophysics of nucleic acids. 7. Biophysics of sugars and non-protein biopolymers. 8. Biophysics of biological membranes. 9. Membrane transport. 10. Movement in biological systems. 11. Molecular imaging of macromolecules and macrostructures. 12. Cytoskeleton. Intracellular hydrodynamics. 13. Other biophysical methods for studying molecular systems.
Prerequisites and co-requisites	Completion of courses in: organic chemistry, biochemistry, cell biology

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
100%	60.0%	100.0%

Recommended reading	Basic literature	1. L. Wilson and P. Tran ed., Methods in cell biology. Elsevier 2015. 2.M.B. Jackson, Molecular and cellular biophysics. Cambridge University Press 2006. 3.D.J. Houde and S.A. Berkpwitz ed., Biophysical characterisation of proteins in developing pharmaceuticals. Elsevier 2015. 4.P.F. Dillon, Biophyscics. A physiological approach. Cambridge University Press 2012. 5.M.C. Williams and L.J. Maher III ed., Biological and medical physics. Biophysics of DNA-protein interactions. Springer 2011. 6.T. Jue, Fundamental concepts in biophysics. Humana Press 2009. 7.I.N. Serdyuk, N.R. Zaccai, J. Zaccai, Methods in molecular biophysics, Cambridge University Press 2007.
	Supplementary literature	publications present during the lecture
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	elements of the secondary structure of proteins elements of membrane structure elements of the structure of membrane channels structure of macromolecules such as starch, chitin or silk molecular imaging methods fluorescence spectroscopy electron cryomicroscopy
Work placement	Not applicable