GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basic of biochemistry, PG_00057693		
Field of study	Green Technologies		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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	3	Language of instruction	Polish Polish, with numerous illustrations in English
Semester of study	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry Technology and Biotechnology of Food -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Agnieszka Bartoszek-Pączkowska	
	Teachers		

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	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	45	2.0	28.0	75

Subject objectives	
	Lectures in Biochemistry aim at making the students familiar with basic biochemical concepts and functioning of organic matter. The particular emphasis is placed on chemical aspects of processes underlying function of living things. The interrelations between toxicity of some environmental factors resulting from human activities and their impact on living things are indicated. The lectures are supplemented by laboratory exercises aimed at explaining the students the ways of observing phenomena that have been raised during lectures.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W04] is aware of the importance of environmental protection and has a basic knowledge of chemical and biological threats to the environment, with particular emphasis on anthropogenic factors, has a basic knowledge of knowledge of the principles of sustainable development as well as national and European environmental management conditions.	The student identifies basic cellular structures and explains their functions. The student characterizes the levels of structural organization of proteins and nucleic acids.	[SW1] Assessment of factual knowledge
[K6_U03] is able to use information and communication technologies relevant to the common tasks of engineering, is able to use known methods and mathematical-physical models to describe and explain phenomena and chemical processes	The student is able to measure reaction kinetics and calculate enzyme activity on this basis; The student is able to distinguish between toxic and non-toxic substances.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K6_U04] capable of formulating and solving design tasks in the field of environmental technology to recognize their non-technical aspects, including environmental, economic and legal. Is capable of applying the principles of occupational health and safety. Is able to make initial assessment of engineering solutions and actions	Student is able to: - identify cellular structures and explain their functions; - describe all levels of basic protein and nucleic acid structures; - explain the importance of lipids and polysaccharides; - describe gene expression processes; - explain cellular processes involved in energy production;	[SU2] Assessment of ability to analyse information

Subject contents

Course content – lecture

are indicated. The lectures include the topics: 1. Unity of mater in the light of Solar system evolution. Structure and function of prokaryotic and eukaryotic cells. Organelles, including their function in protection against environmental challenges. 2. Proteins. Structure and biological functions. Selected examples: oxygen transporting proteins, physiological role and environmental risks; antibodies, physiological role and application in analytical chemistry. 3. Enzymes as biocatalysts. Examples of catalytic mechanisms. Regulation of enzymatic activity. Inhibitors and poisons. 4. Lipids. Structure and functions. Structure of biological membranes and its protective role. Environmental factors that may damage membranes. 5. Polysaccharides. Occurrence and function. 6. The structure of nucleic acids. DNA structure determines its function. Transfer and use of genetic information. DNA damage by genotoxic factors. 7. Metabolism. Basic features. Organisation and interrelations of metabolic pathways.Biodegradation of saccharides and lipids as a source of metabolic energy and precursors for the reactions.

Course content – laboratory
The lectures are supplemented by laboratory exercises aimed at explaining the students the structure of DNA and its damage, enzymatic kinetics, the interaction of cell wall with the environment, and assessment of toxicants' impact towards cells.

Prerequisites and co-requisites

The acquaintance with basics of organic chemistry, physical chemistry and laboratory techniques.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
70% lecture	50.0%	70.0%
30% laboratory	100.0%	30.0%

Recommended reading

Basic literature	Biochemia, E. Bankowski, PWN, Warszawa, 2009 Podstawy biologii komorki. Wprowadzenie do biologii molekularnej B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter
Supplementary literature	Zarys Ekotoksykologii, red. Namiesnik J., Jaskowski J., EKO- Pharma, Gdansk 1994Podstawy ekotoksykologii, Z. Zakrzewski, 1996
eResources addresses	

Example issues/ example questions/ tasks being completed

1. Tell the difference between competitive and noncompetitive enzymes and enzymatic poisons. 2. What role in the cell play DNA and RNA? 3. Describe the differences in the structure and function of starch, glycogen and cellulose. 4. Explain the basic assumptions of chemiosmosis that integrates flow of electrons and ATP synthesis during oxidative phosphorylation.
5. Describe briefly the replication of the leading DNA strand (synthesized in a continues way) in a prokaryotic cell. 6. Write with full formulas the indicated fragment of Krebs cycle. Add the enzymes involved and all necessary reactants. Is any of the enzymes regulated? What is the mechnism behind this regulation.

Practical activites within the subject

Not applicable

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