GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	BASIC OF BIOCHEMISTRY, PG_00048790		
Field of study	Green Technologies		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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
Semester of study	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry, Technology and Biochemistry of Food -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Agnieszka Bartoszek-Pączkowska	
	Teachers		

Lesson types and methods of instruction

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.

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.	Student has the basic knowledge in the area of biochemistry necessary for the comprehension of biochemical phenomena and processes utilized in environmental technologies, in particular: - Student enumerates cellular structures and explains their functions; - Student describes all levels of protein and nucleic acids structures; - Student explains the roles of lipids and polysacchrides; - Student describes the processes involved in gene expression; - Student explains cellular mechanisms dedicated to energy production	[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	Student performs measurements of reaction kinetics and on this basis calculates enzymatic activity of eg. detoxifying enzymes; Student carries out colorimetric measurements to assess biological impact of exogenic substances, e.g. binding of ions to cellular walls; Student indicates substances detrimental to eukaryotic cells based on cell membrane permeability for trypan blue	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information

<table>
<tr><td>Subject contents</td><td>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 include the topics:

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.

Proteins. Structure and biological functions. Selected examples: oxygen transporting proteins, physiological role and environmental risks; antibodies, physiological role and application in analytical chemistry.

Enzymes as biocatalysts. Examples of catalytic mechanisms. Regulation of enzymatic activity. Inhibitors and poisons.

Lipids. Structure and functions. Structure of biological membranes and its protective role. Environmental factors that may damage membranes.

Polysacchrides. Occurrence and function.

The structure of nucleic acids. DNA structure determines its function. Transfer anduse of genetic information. DNA damage by genotoxic factors.

Metabolism. Basic features. Organisation and interrelations of metabolic pathways.

Biodegradation of sacchrides and lipids as a source of metabolic energy and precursors for the reactions.

The lectures are supplemented by laboratory exercises aimed at explaining the students the ways of observing phenomena that have been raised during lectures as well as methods used for the assessments of environmental risks for living things.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of inorganic and organic chemistry</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>Lecture</td><td>50.0%</td><td>70.0%</td></tr>
<tr><td>Laboratory</td><td>100.0%</td><td>30.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Biochemistry, K. Campbell & Farell S., Brooks Cole, any edition</td></tr>
<tr><td>Supplementary literature</td><td>Essential Cell Biology, B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter, W.W Norton & Company</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table>
</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Tell the difference between competitive and noncompetitive enzymes and enzymatic poisons.

What role in the cell play DNA and RNA?

Describe the differences in the structure and function of starch, glycogen and cellulose.

Explain the basic assumptions of chemiosmosis that integrates flow of electrones and ATP synthesis during oxidative phosphorylation.

Describe briefly the replication of the leading DNA strand (synthesized in a continues way) in a prokaryotic cell.

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.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>