



Subject card

Subject name and code	BASIC OF BIOCHEMISTRY, PG_00048769						
Field of study	Green Technologies						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2022/2023		
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		
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		prof. dr hab. inż. Agnieszka Bartoszek-Pączkowska				
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 Basics of Biochemistry aim at familiarising students with fundamental biochemical concepts and functioning of living things. Particular emphasis is placed on chemical side of processes ensuring the function of organisms. Also the connection between dangerous environmental risk factors resulting from human activities and their impact on living things is indicated. The lectures are supplemented by laboratory exercises, that explain the students the ways of studying of phenomena discussed during lectures and their application in assessments of environmental risks for living things.						

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 gains the basic knowledge in biochemistry necessary to describe and comprehend phenomena and biochemical processes utilised in environment protection, in particular: - Student enumerates cellular components and understands their functions, - Student describes all levels of basic protein and nucleic acids structures, - Student explains the significance of lipids and polysaccharides, - Student describes the gene expression processes, - Student explains the cellular processes serving the 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, e.g. detoxifying enzymes; Student performs colorimetric measurements and uses them to assess biological impact of exogenous substances, e.g. binding of ions to cell walls; Student irradiates plasmid DNA sample and after electrophoresis observes the genotoxic impact of UVB; Student learns the techniques of protein isolation and electrophoretic separation	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
Subject contents	<p>Lectures aim at familiarising students with fundamental biochemical concepts and functioning of living things. Particular emphasis is placed on chemical side of processes ensuring the function of organisms. Also the connection between dangerous environmental risk factors resulting from human activities and their impact on living things is indicated. The scope of lectures embraces the following problems:</p> <ol style="list-style-type: none"> 1. The unity of living things in the aspects of Solar System evolution. Structure and function of eukaryotic and prokaryotic cells. Organelle, in particular those protecting cells against detrimental environmental factors. 2. Proteins. Structures and biological functions. Selected examples: proteins transporting oxygen, physiological role and impairment of their function by environmental risk factors; antibodies - physiological role and applications in analytical chemistry. 3. Enzymes as biocatalysts. Examples of mechanisms of enzymatic reactions. Regulation of enzymatic activity. Inhibitors and poisons of enzymes. 4. Lipids. Structure and function. Structure of biological membranes and their protective roles. Environmental factors disrupting membranes. 5. Polysaccharides. Occurrence and function. 6. Composition of nucleic acids. DNA structure determine its function. Transmission and utilisation of genetic information. DNA damage by environmental factors. 7. Metabolism. Basic definitions. Organization and interrelationships between metabolic pathways. 8. Biodegradation of polysaccharides and lipids as a source of metabolic energy and precursors for biosyntheses. Mechanisms of regulation. <p>Laboratory exercises are connected with topics of lectures and embrace: detection of UV induced DNA damage, isolation and composition assessment of protein preparations, determination of enzymatic reaction kinetics, the monitoring of the interactions of cell walls with the environment.</p>		
Prerequisites and co-requisites	The basic knowledge in organic chemistry, physical chemistry as well as familiarity with laboratory techniques.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lectures	50.0%	70.0%
	Laboratory	100.0%	30.0%
Recommended reading	Basic literature	"Biochemistry", M.K. Cambell or "Biochemistry", M.K. Cambell and O. Farrell	
	Supplementary literature	"Ecotoxicology", Z. Zakrzewski, 1992	
	eResources addresses	Adresy na platformie eNauczanie: Basics of Biochemistry - Moodle ID: 30573 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=30573 Basics of Biochemistry - Moodle ID: 30573 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=30573	

Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. What is the difference between competitive, noncompetitive inhibitors and poisons of enzymes 2. Tell the difference between the structure and function of starch, glycogen and cellulose. 3. What roles in the cell play DNA and RNA? 4. Describe briefly the process of the leading DNA strand replication. 5. Write in full structures the marked fragment of Krebs cycle. Indicate the enzymes and other necessary substances. Which of the enzymes is regulated? What is the mechanism of this regulation?
Work placement	Not applicable