

Subject name	Biochemistry	
Subject code	E.1z.BCH.SC.ECTIE.O (winter) E.1.1.BCH.SC.ECTIE.O (summer)	
Department	Biochemistry Department, Institute of Plant Biology and Biotechnology	
Faculty	Faculty of Biotechnology and Horticulture	
Subject supervisor/Lecturer	Dr. Pawel Kaszycki / Dr. Pawel Kaszycki, Dr. Anna Kostecka-Gugala, Dr. Iwona Ledwozyw-Smoleń	
General information	Teaching period	1 semester / winter or summer semester
	ECTS credit	10
	Assessment method	written examination – test; classes: written reports on lab results
	Lectures total	30
	Classes total	60
Objective and general description	<p>The aim of the course is to teach basics of structural biochemistry, metabolic processes as well as regulatory mechanisms governing anabolism, catabolism and cell bioenergetics. Lectures give systematic knowledge on the structure and functions of biopolymers, their biosynthesis, cell membranes and transport mechanisms, transcription and translation, biological oxidations and respiratory chain reactions. Laboratory classes focus on developing practical skills in basic biochemical and analytical methods.</p>	
Lectures (every unit = 2h)	<p>1. 2. Scope of biochemistry, the elements of life, hierarchical organization of organic matter, cell structure (bacterial, animal and plant); water as the medium of life – unique properties of water enable reactions and processes in living organisms; chemical bonds and physical forces responsible for interactions between biological macromolecules and for structural organization of cell constituents</p> <p><i>Structure and functions of biomolecules:</i></p> <p>3. Carbohydrates – mono- oligo- polisaccharides and their derivatives.</p> <p>4. Aminoacids, peptides and proteins; the structure of a peptide bond; protein structure and conformation: from primary to quaternary organizational levels.</p> <p>5. Lipids and fatty acids – structure and functions.</p> <p>6. Biological membrane structure and dynamics; transport mechanisms.</p> <p>7. 8. Nucleic acids – their molecular organization and role in gene expression and metabolism; basic mechanisms of DNA replication and transcription.</p>	

	<p>9. Protein biosynthesis and mechanisms of segregation, targeting and secretion.</p> <p>10. Biological catalysis – enzyme structure, classes, substrate specificity, optima, structural and kinetic models of enzymatic action; regulatory mechanisms.</p> <p><i>Fundamentals of cellular metabolism regulation and bioenergetics - main anabolic and catabolic pathways and cycles and their localization within cell structures:</i></p> <p>11. Glycolysis.</p> <p>12. Tricarboxylic acid cycle.</p> <p>13. Electron transport chain and oxidative phosphorylation.</p> <p>14. Photosynthesis, gluconeogenesis, glycogen metabolism.</p> <p>15. Pentose phosphate pathway, fatty acid catabolism.</p>
Classes	<p>Chemical properties of biologically important molecules and biopolymers – laboratory classes are divided into blocks, each devoted to a particular group of biomolecules:</p> <p>saccharides and their derivatives;</p> <p>aminoacids, peptides and proteins;</p> <p>lipids and their chemical components; lipid-soluble vitamins;</p> <p>nucleic acids and biologically-relevant organic acids;</p> <p>enzymes and co-enzymes, water-soluble vitamins;</p> <p>plant secondary metabolites.</p>
References	<ol style="list-style-type: none"> 1. Alberts B. <i>et al. Essential Cell Biology</i>, 2nd edn., Garland Science, LLC, 2004 2. Mathews, Van Holde, Ahern, <i>Biochemistry</i>, 3rd edn. The Benjamin/Cummings Pub. Com. Inc, 2001, CA. USA. 3. Avers C.J., <i>Molecular Cell Biology</i>. The Benjamin/Cummings Pub. Com. Inc, 1986 CA. USA. 4. Garret R. & Grisham Ch., <i>Biochemistry</i>. 2002 5. Lehninger A.L. <i>Biochemistry</i> 4th edn., W.H. Freeman, 2005