

Module name	<b>Biochemistry</b>
Module code	B-BM.062Eng
ISCED code	0511: Biology
Study cycle	I <sup>o</sup>
Semester	winter
Responsible for this module	dr Justyna Sulej Department of Biochemistry and Biotechnology email: justyna.sulej@poczta.umcs.lublin.pl
Language of instruction	English
Website	
Prerequisites	passed organic chemistry course
ECTS	7,5
ECTS points hour equivalents	Contact hours (work with an academic teacher) – 90 - lectures: 30 - labs: 60  Non-contact hours (students' own work) – 100 - preparation for the exam: 40 - preparation for labs: 20 - preparation of reports from laboratory exercises: 20 - literature study: 20  <b>Total number of ECTS points for the module - 7,5</b>
Learning outcomes verification methods	lecture - written exam laboratory – tests, continuous assessment during laboratories
Course full description	<b>LECTURE:</b> Structure, systematics, function and basics of metabolism of: amino acids, proteins, enzymes and their cofactors, carbohydrates, lipids, non-amino acid nitrogen compounds, nucleic acids, regulation of metabolism and gene expression. Fundamentals of enzymes/proteins spatial structure and function. Basics of cofactors and vitamins. Basics of biochemistry of biological membranes, including transport and cell signaling. Routes and location of primary and indirect metabolism. Basics of integration and regulation of basic and indirect metabolism.  <b>LABORATORY:</b> 1. Structure, systematics, functions and metabolism of amino acids (formulas and common names of protein amino acids, physical and chemical properties of amino acids, classification and methods for determining amino acids, distribution of amino acids, biosynthetic amino acid families). Qualitative and quantitative analyzes of amino acids. 2. Structure, systematics, functions and metabolism of proteins (physical and chemical properties of proteins, protein classification, occurrence and biological functions of proteins, protein structure (I-, II-, III-, IV-order structure) and peptide binding characteristics). Qualitative and quantitative analyzes of proteins. 2. Enzymology - structure and classification of enzymes, kinetics of enzymatic reactions, inhibition and activation of enzymes and methods of expressing enzymatic activity. Methods for determining enzymes. 3. Structure, systematics, functions and metabolism of carbohydrates (Formulas and names of the most important mono-, disaccharides, structure, properties of polysaccharides, biological functions of sugars, physical

	<p>and chemical properties of sugars, synthesis and degradation of glycogen and starch, sugar metabolism: course and regulation of glycolysis, gluconeogenesis, pentose phosphate cycles, tricarboxylic acid sequences, fermentation and photosynthesis, respiratory chain). Qualitative and quantitative analyzes of sugars.</p> <p>4. Structure, systematics, functions and metabolism of lipids (lipid classification - properties, biological role, formulas and names of representatives of individual groups, saturated and unsaturated fatty acids - systematic and customary formulas and names, properties, lipoproteins - division, role and properties, lipid metabolism: routes for the synthesis and degradation of fatty acids, the main stages of triacylglycerol and cholesterol metabolism). Qualitative analyzes of lipids.</p> <p>5. Structure, systematics, functions and metabolism of nitrogen compounds (cellular nitrogen metabolism, atmospheric nitrogen fixation, urea cycle, heme, cytochromes and chlorophylls - the most important stages of synthesis and degradation). Analyzes of selected nitrogen compounds (non-protein nitrogen, urea and uric acid).</p> <p>6. Structure, systematics, functions and metabolism of nucleic acids (nucleotides - structure, names and formulas, main stages of synthesis and degradation, RNA and DNA - structure, types, properties, place and role in the cell, replication, transcription - stages and enzymes, translation - stages and enzymes, RNA production from plant material and RNA and DNA determination.</p>
Bibliography	<p>Pratt C.W. and Cornely C. Essential biochemistry. Hoboken, John Wiley &amp; Sons, Inc., 2014;  Voet D.J., Voet J.G., Pratt C.W., Principles of Biochemistry, 5th global ed., John Wiley &amp; Sons, Inc., 2018;  Berg, Tymoczko, Stryer, Biochemistry, New York: W.H. Freeman and Company, 2012.</p>
Learning outcomes	<p><b>KNOWLEDGE</b>  The graduate:  1. Defines the basic processes and phenomena including basic general knowledge of the structure and function of the most important groups of organic compounds, and metabolic transformations of these compounds at the cellular level.  2. Has basic knowledge of research techniques used in biochemistry for the analysis of organic compounds and biochemical processes.</p> <p><b>SKILLS</b>  The graduate:  1. Uses basic terminology and knowledge relevant to biochemistry.  2. Uses basic methods and specialized scientific equipment, conducting observations and experiments in the field of basic biochemical processes.  3. Interprets the results of conducted experiments and draws conclusions based on observations made.  4. Documents and presents the effects of own work.</p>

	<p>5. Skillfully performs observations and tests ordered by a scientific supervisor</p> <p><b>SOCIAL COMPETENCES</b>  The graduate:</p> <ol style="list-style-type: none"> <li>1. Is responsible for own safety and for colleagues.</li> <li>2. Is convinced of the need to comply with health and safety regulations during activities related to observation and biochemical tests.</li> </ol>
Practice	<p>The laboratory classes provide the practical study of analyzes qualitatively and quantitatively the most important groups of organic compounds found in biological material: amino acids, proteins, enzymes and their cofactors, carbohydrates, lipids, non-amino acid nitrogen compounds, nucleic acids.</p>
Teaching methods	<p>lectures, conversations, laboratory classes</p>