

Course title: BIOCHEMISTRY WITH ELEMENTS OF CHEMISTRY 2/2

ECTS credit allocation (and other scores): 8

Semester: autumn

Level of study: ISCED-7 - second-cycle programmes (EQF-7)

Branch of science: Medical and health sciences

Language: English

Number of hours per semester: 90

Course coordinator/ Department and e-mail: Edyta Sienkiewicz-Szłapka/ Biochemistry,
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Type of classes: classes and lectures

Substantive content

CLASSES: SEMINARS: Glycoproteins and GAGs. Metabolism of xenobiotics and ethanol. Hormones that regulate fuel metabolism. Metabolic parameters of diabetes. Lipoproteins metabolism and atherosclerosis. Metabolic defects in amino acids metabolism. Conversion of amino acids to specialized products. Metabolism of muscle at rest and during exercise. Vitamins. **LAB CLASSES.** Isolation of genomic DNA from cells of cheek epithelium. Quantitative and qualitative assessment of isolated DNA. Amplification of DNA by PCR method. Identifying the content of glucose in serum. Protein glycation. Identification of protein glycation products. Obtaining fructose 1,6-diphosphate. TLC of carbohydrates and the brain polar lipids. Identifying total cholesterol and HDL fraction in serum. Division of essential oils with two-way TLC. Division of leaf pigments with thin layer chromatography. Identification of amino acids in urine. Quantitative identification of creatinine and uric acid in blood serum. Identifying vitamin C.

LECTURES: Introduction to metabolism. Glycolysis and lactic fermentation. Corich cycle. Pyruvate metabolism. Process and regulation of gluconeogenesis, glycogenogenesis and glycogenolysis. Pentose Phosphate Pathway. Process, regulation and perturbation of citric acid cycle and respiratory chain. Triacylglycerols metabolism. Oxidation and biosynthesis of fatty acids. Glycerol transformation. Ketone bodies metabolism. Complex lipids metabolism. Eicosanoids metabolism. Steroid metabolism. Metabolic turnover of proteins. Metabolism of amino acids amino groups. Urea cycle. Amino acids biosynthesis and degradation. Porphyrin metabolism. Biosynthesis and degradation of purine and pyrimidine nucleotides and perturbation in their metabolism. Integration of metabolism. Metabolic profile of organs.

Learning purpose: Study the molecular basics of body functioning in physiological and pathological conditions, genetic and environmental factors disturbing of biochemical pathways. Learning the basic laboratory methods, techniques and equipment.

On completion of the study programme the graduate will gain:

Knowledge: The command of the structure-function relationships of the organic molecules, biochemical pathways in the human body (on the cellular, tissue, and organ level) in the health and disease context, the acquaintance of the consequences of imbalanced diet, and basics aspects of xenobiotics metabolism.

Skills: The ability to predict the direction of metabolic changes depending on the cellular energetic state, the competence of explaining the human body biochemical homeostasis and consequences of its disturbances, the skills of the use the basic techniques applied in laboratory diagnostics, analyzing and interpreting the results of biochemical tests

Social Competencies: Cooperating and working in a group, performing the laboratory tasks with obeying the rules of occupational safety and health, presenting a favorable attitude towards the promotion of a pro-healthy lifestyle.

Basic literature: 1) Harvey Richard and Ferrier Denise, Lippincott's Illustrated Reviews: Biochemistry, publ. Wolters Kluwer | Lippincott Williams & Wilkins, 2017, vol. 1, pp. 551; 2) Lieberman Michael, Marks Allan D., Marks' Basic Medical Biochemistry: A Clinical Approach, publ. Wolters Kluwer | Lippincott Williams & Wilkins, 2018, vol. 1, pp. 1000

Supplementary literature: 1) Murray Robert K., Bender David A., Botham Kathleen M., Kennelly Peter J., Rodwell Victor W., Weil P., Harper's Illustrated Biochemistry, publ. The McGraw-Hill Companies, 2018, vol. 1, pp. 800; 2) Salway J.G., Medical Biochemistry at a glance, publ. Wiley-Blackwell, 2012, vol. 1, pp. 169

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 95

Student's independent work: 105