UNIVERSITY
OF WARMIA AND MAZURY
IN OLSZTYN

Faculty of Biology and Biotechnology

Course title: BIOCHEMISTRY WITH ELEMENTS OF CHEMISTRY 1/2

ECTS credit allocation (and other scores): 6

Semester: spring

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

Branch of science: Medical and health sciences

Language: English

Number of hours per semester: 80

Course coordinator/ Department and e-mail: Edyta Sienkiewicz-Szłapka / Biochemistry, edyta.sienkiewicz@uwm.edu.pl

Type of classes: classes and lectures

Substantive content

CLASSES: SEMINARS: Water and pH. The major buffer system in the body. Acidosis and alkalosis. Cell membranes biochemistry. Blood plasma proteins. Hemostasis and thrombosis. Disorders of synthesis and/or structure of proteins. Processing of proteins in the cells. LABs: Determination of the dissociation constant of the weak acid. Determination of the rate constant of a chemical reaction. Determination of the buffer capacity. Spectrum analysis of hemoglobin derivatives. Preparation of aspirin. Calculation of the solutions concentrations and doses of drugs. Quantitative protein identification. Electrophoresis of serum proteins. Fibrinogen release and quantitative identification. Isolation and identification of peroxidase activity. Identifying the Km of peroxidase. Identifying the activity of ALT, AST, and GGTP.

LECTURES: Atoms and elements. Chemical compounds and their bonds. The bases of chemical calculations. Stoichiometry of chemical reaction. Properties of solution. The solubility of the substance. Expressing of solutions concentrations. Reactions in aqueous solutions. Buffers. Redox reactions. Colloids and osmotic pressure. Structures and properties of the major organic compounds of the body. Peptides and proteins structure, properties and functions. Enzymes – properties, kinetics of reaction and activity regulation. DNA structure, replication and repair. RNA structure, synthesis and processing. Protein synthesis. Regulation of gene expression.

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 acquaintance of the matter structure at the molecular level, the relationship between the structure and functions of the cell basic ingredients, the molecules biotransformation, and biochemical pathways in the human body in the context of human health and disease.

Skills: The ability to explain the dependency between human health and disease on the base of biochemical knowledge, 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) Timberlake Karen C., Chemistry - an introduction to general, organic and biological chemistry, publ. Prentice Hall, 2018, vol. 1, pp. 750; 2) Harvey Richard and Ferrier Denise, Lippincott's Illustrated Reviews: Biochemistry, publ. Wolters Kluwer I Lippincott Williams & Wilkins, 2017, vol. 1, pp. 551; 3) 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: 82

Student's independent work: 68