



48SJ-BECHII

ECTS: 8

YEAR: 2021Z

**BIOCHEMISTRY WITH ELEMENTS OF CHEMISTRY 2/2**  
**BIOCHEMISTRY WITH ELEMENTS OF CHEMISTRY 2/2****COURSE CONTENT**  
**CLASSES**

SEMINARS. Obligatory problems: 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. Additional problems: Caloric homeostasis and body weight regulation. Anabolic steroids as a doping. The human body in extreme conditions. Biochemical basics of diseases. Between magic and medicine. Overcome the stress. 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 the blood serum. Protein glycation. Identification of protein glycation products. Obtaining fructose 1,6-diphosphate. TLC chromatography of carbohydrates. TLC of the brain polar lipids. Identifying total cholesterol in blood serum and cholesterol in the HDL fraction. Chromatographic division of essential oils with two-way TLC chromatography. Division of leaf pigments with thin layer chromatography (TLC). 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.

**EDUCATIONAL OBJECTIVE:**

During the course, the students are familiarised with molecular basics of human body functioning in correct and pathological conditions. They master the main metabolic pathways and are familiarized with genetic and environmental factors disturbing their course. The students also learn basic laboratory methods and techniques as well as the equipment applied in laboratory diagnostics. As a result, they obtain expertise and skills necessary to understand the subjects taught in their further education (i.e.: physiology, immunology, pathology, clinical subjects) and indispensable in their future professional practice.

**DESCRIPTION OF LEARNING OUTCOMES FOR THE COURSE IN RELATION TO FIELD AND MAJOR LEARNING OUTCOMES**

Codes of learning outcomes in a major field of study:	M/NM+++,
Codes of learning outcomes in a major area of study:	B.U10.+ , B.U11.+ , B.U6.++ , B.U8.+ , B.U9.+ , B.W11.+ , B.W12.+ , B.W13.+ , B.W15.+++ , B.W16.++ , B.W17.++ , B.W25.+ , K.11.+ , K.5+ , K.6.+ , K.9.+ ,

**LEARNING OUTCOMES:****Knowledge**

- W1 - describes the structure, properties and functions of basic ingredients of a cell (proteins, carbohydrates, lipids, and nucleic acids); understands the dependency between the structure and the function of an organic compound
- W2 - explains basic notions connected with metabolism
- W3 - knows courses of basic metabolic pathways; indicates their mutual connections; provides names and describes structures of the intermediates; provides names of the enzymes taking part in their course, identifies methods of their regulation as well as genetic and environmental factors that disturb their functioning; provides their localisation in cells and organs
- W4 - explains biochemical aspects that condition human health and describes the essence of metabolic diseases; characterises, on a metabolic level, the consequences of improper nutrition, including the consumption of too copious meals, starvation and an imbalanced diet (the highcarbonate, the high-fat and the high protein one)
- W5 - knows the basics of xenobiotic metabolism in the human body

**Skills**

- U1 - understands the basics of human body functioning on a molecular level in physiological and pathological conditions; identifies the ways of intercellular communication and explains working mechanisms of various hormone groups on a molecular level
- U2 - predicts the direction of metabolic changes depending on the cellular energetic state; understands the essence of energetic homeostasis of the cell and the body
- U3 - understands the basics and describes the principles of biochemical methods as well as practically applies the techniques used in laboratory diagnostics
- U4 - analyses and interprets the results of biochemical examinations as well as prepares a final protocol for the conducted experiments
- U5 - uses the most recent scientific literature and prepares a multimedia presentation on an assigned topic in an understandable way

**Course/module:**

Biochemistry with Elements of Chemistry 2/2

**Fields of education:****Course status:** mandatory**Course group:** A - przedmioty podstawowe**ECTS code:****Field of study:** Medicine**Specialty area:** Medicine**Educational profile:** General academic**Form of study:** full-time**Level of study:** uniform master's studies**Year/semester:** 2 / 3**Type of course:**

Classes, Seminar, Lecture

**Number of hours per semester/week:** Classes: 55, Seminar: 15, Lecture: 20**Teaching forms and methods**

Classes(K2, K3, U3, U4, W1) : conducting experiments, interpretation of the obtained results, Seminar(K1, K2, K4, U1, U2, U5, W1, W3, W4, W5) : Presenting a speech on an assigned subject, multimedia presentation, discussion, case study, debate, Lecture(K1, K4, U1, U2, W1, W2, W3, W4) : lecture with a multimedia presentation and conversations

**Form and terms of the verification results:**

CLASSES: Report - performing analyses and preparing laboratory report(U3, U4, W1) ; CLASSES: Written test - short tests (question types: BOFs, MCQs, short answer questions, computational tasks)(K1, K2, K3, K4, U1, U2, U4, U5, W1, W3, W4, W5) ; SEMINAR: Part in the discussion - being active in discussions(null) ; SEMINAR: Written test - short tests (question types: BOFs, MCQs, short answer questions)(K1, K2, K3, K4, U1, U2, U4, U5, W1, W3, W4, W5) ; SEMINAR: Presentation - an oral presentation of selected problem (with multimedia support) (K1, K2, K4, U1, U2, U5, W3, W4, W5) ; LECTURE: Colloquium test - unit tests (question types: BOFs, MCQs, short answer questions, computational tasks)(K1, U1, U2, U3, W1, W2, W3, W4, W5) ; LECTURE: Written exam - final test comprising the whole programme of the course (about 150 questions); (question types: BOFs, MCQs, short answer questions, computational tasks) (K1, U1, U2, U3, W1, W2, W3, W4, W5)

**Number of ECTS points:** 8**Language of instruction:** English**Introductory courses:**

Biophysics, Molecular Biology and Genetics

**Preliminary requirements:**

Standard level of knowledge covered by of the introductory subjects and chemistry (the High School level at least)

**Name of the organizational unit offering the course:**

Katedra Biochemii,

**Person in charge of the course:**

dr Edyta Sienkiewicz-Szłapka,

**Course coordinators:**

**Social competence**

- K1 - is aware of the need update one's knowledge constantly and to improve professional skills
- K2 - cooperates and works in a group assuming various roles in it
- K3 - completes tasks in a safe way; obeys the rules of the occupational safety and health
- K4 - presents favourable attitude towards promotion of pro-healthy lifestyle

**Notes:****BASIC LITERATURE**

- 1) Harvey Richard and Ferrier Denise, Lippincott's Illustrated Reviews: Biochemistry, wyd. Wolters Kluwer | Lippincott Williams & Wilkins, 2017, t. 1, s. 551; 2) Lieberman Michael, Marks Allan D., Marks' Basic Medical Biochemistry: A Clinical Approach, wyd. Wolters Kluwer | Lippincott Williams & Wilkins, 2018, t. 1, s. 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, wyd. The McGraw-Hill Companies, 2018, t. 1, s. 800; 2) Salway J.G. , Medical Biochemistry at a glance, wyd. Willey-Blackwell, 2012, t. 1, s. 170

## Detailed description of the awarded ECTS points - part B

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### **BIOCHEMISTRY WITH ELEMENTS OF CHEMISTRY 2/2** **BIOCHEMISTRY WITH ELEMENTS OF CHEMISTRY 2/2**

The awarded number of ECTS points is composed of:

#### 1. Contact hours with the academic teacher:

- participation in: classes	55 h.
- participation in: seminar	15 h.
- participation in: lecture	20 h.
- consultation	5 h.
	95 h.

#### 2. Student's independent work:

- preparation for the final exam	40 h.
- preparation for the laboratory classes	30 h.
- preparation of an oral speech with multimedia support on seminar classes	5 h.
- preparation to the discussion on seminar classes	30 h.
	105 h.

1 ECTS point = 25-30 h of the average student's work, number of ECTS points = 200 h : 25 h/ECTS = 8,00 ECTS

on average: **8 ECTS**

- including the number of ECTS points for contact hours with direct participation of the academic teacher:	3,80 ECTS points,
- including the number of ECTS points for hours completed in the form of the student's independent work:	4,20 ECTS points,