UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN

Course sylabus – part A
Biochemistry 2/2

48SJO-BIOCHE22
2025
ECTS: 6.00

Legal acts specifying learning outcomes: 467/2024 (Medicine),
Status of the course: None
Group of courses: None
Discipline: Medical Sciences
Classes:
Lecture (20 h)
Classes (40 h)
Seminar (15 h)
Step: Kierunek lekarski drugi rok (oferta w jęz. angielskim dla obcokrajowców)
Program: Medicine
Form of studies:full-time
Level of studies: uniform master's studies

Introductory subject: Biophysics, Chemistry, Cytophysiology, Molecular Biology

Prerequisites: Level 4 of The European Qualifications Framework (EQF) at least, and the satisfactory level of knowledge and skills covered by the introductory subjects.

Coordinators:

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SUBJECT MATTER CONTENT:

Seminar
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. Adipose tissue metabolism. Vitamins.

Lecture
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.

Classes
Quantitative identification of glucose in the blood serum. Process of protein glycation. Determination of fructosamine and HbA1c concentration in the blood. Biotransformation of sucrose to fructose 1, 6-bisphosphate. TLC chromatography of carbohydrates. TLC of the brain polar lipids. Identifying total cholesterol in blood serum and cholesterol in the HDL fraction. Separation of essential oils with two-way TLC chromatography. Separation 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.

TEACHING OBJECTIVE:
During the course, students are familiarised with the molecular basis of the functioning of the human body under physiological and pathological conditions. They master the most important metabolic pathways and learn how genetic and environmental factors intervene in their course and what consequences their effects have. Students also learn basic laboratory methods and techniques and the equipment used in laboratory diagnostics. They develop the ability to search for reliable information in the field of

medical biochemistry.

DESCRIPTION OF THE LEARNING OUTCOMES OF THE COURSE IN RELATION TO THE DESCRIPTION OF THE CHARACTERISTICS OF THE SECOND LEVEL LEARNING OUTCOMES FOR QUALIFICATIONS AT LEVELS 6-8 OF THE POLISH QUALIFICATION FRAMEWORK IN RELATION TO THE SCIENTIFIC DISCIPLINES AND THE EFFECTS FOR FIELDS OF STUDY:

Symbols for outcomes related to the discipline:

M/NMA_P7S_KO+++++, M/NMA_P7S_ UW+++++++, M/NMA_P7S_UW+++, M/NMA_P7S_WG++++++++++

Symbols for outcomes related to the field of study:

K.5+, K.10.+, K.9.+, K.6.+, K.11.+, B.U12.++, B.U11.+, B.U6.+, B.U8.++, D.U7.+, KA7_UW5+, KA7_UU1+, KA7_UK2+, B.W9.+, B.W11.+, A.W2.+, B.W13.+, B.W15.++, B.W20.+, C.W29.+, C.W36.+, C.W39.+, C.W40.+, B.W14.+

LEARNING OUTCOMES (Knowledge, Skills, Social competence):

W1	structure, properties, types and functions of simple and complex carbohydrates, lipids and non-protein compounds containing nitrogen (amino acids and their derivatives - porphyrins, biogenic amines, melanins, creatine and nucleotides)
W2	the course and cellular location of catabolic and anabolic pathways of metabolism of carbohydrates, lipids and nitrogen compounds, their mutual connections and mechanisms of regulation, as well as disease entities associated with their course disturbances and the molecular basis of used therapies
W3	metabolic profiles of tissues and organs
W4	basics of metabolism of xenobiotics and ethanol
W5	consequences of improper nutrition on a metabolic level (long-term starvation, eating of over-caloric meals, or an unbalanced diet) and metabolic consequences of deficiency or excess of vitamins and minerals in the body
W6	principles of methods used in the biomedical analysis in the field of disorders of the metabolism of carbohydrates, lipids and non-protein nitrogen-containing compounds
U1	perform isolation, identification and quantification of carbohydrates, lipids and nitrogen-containing compounds using basic laboratory techniques (e.g. spectrophotometry, chromatography)
U2	operate measuring instruments and assess the accuracy of measurements
U3	analyze the results obtained, perform calculations assessing the concentrations or activity of the determined compounds and draw conclusions based on them, interpret basic laboratory test results and identify possible causes of deviations from the norm, prepare documentation of the performed experiments
U4	predict the direction of biochemical processes depending on the energy state of cells and based on a knowledge of regulatory mechanisms
U5	use medical databases and peer-reviewed information sources as well as critically analyze medical literature

U6	prepare and present scientific information in a simple and understandable way (multimedia presentation)
U7	cooperates and works in a group assuming various roles in it
K1	is aware of the need to update one's knowledge constantly and to improve professional skills
K2	express one's opinion sensibly, candidly, and with respectability to the distinct opinion of the interlocutor
K3	cooperate in a multicultural and multinational environment and show an understanding of ideological and cultural differences
K4	presents favorable attitude towards promotion of pro-healthy lifestyle
K5	comply with occupational health and safety rules in the laboratory

TEACHING FORMS AND METHODS:

Seminar-['W1', 'K1', 'W2', 'K2', 'W3', 'K3', 'W4', 'U4', 'K4', 'W5', 'U5', 'U6', 'U7']-Presenting a speech on an assigned subject, multimedia presentation, discussion, case study, debate,

Lecture-['W1', 'K1', 'W2', 'K2', 'W3', 'U4', 'K4', 'W5']-Conversational lecture with the use of multimedia

Classes-['W1', 'U1', 'K1', 'U2', 'K2', 'U3', 'K3', 'K4', 'K5', 'W6', 'U7']-practical laboratory exercises

FORM AND CONDITIONS OF VERIFYING LEARNING OUTCOMES:

Lecture-(Written exam)-['W1', 'K1', 'W2', 'W3', 'U3', 'W4', 'U4', 'W5']-Final test comprising the whole program of the course - 1/2 and 2/2 (about 150 questions); (question types: BOFs, MCQs, short answer questions, computational tasks)

Classes-(Report)-['W1', 'U1', 'K1', 'U2', 'K2', 'U3', 'K3', 'K4', 'K5', 'W6', 'U7']-performing analyses and preparing laboratory report

Seminar-(Presentation)-['W1', 'K1', 'W2', 'K2', 'W3', 'K3', 'W4', 'U4', 'K4', 'W5', 'U5', 'U6', 'U7']-an oral presentation of the selected problem (with multimedia support)

Seminar-(Written test)-['W1', 'K1', 'W2', 'W3', 'W4', 'U4', 'W5']-written checking of knowledge in the field of problems assigned to seminar classes (short test with 6 questions; questions: closed type with one or more correct answers (BOFs/MCQs), true-false, matching the right answer or open-question type with a short answer

Seminar-(Part in the discussion)-['W1', 'K1', 'W2', 'K2', 'W3', 'K3', 'W4', 'U4', 'K4', 'W5', 'U5', 'U6', 'U7']-being active in discussions

Lecture-(Colloquium test)-['W1', 'K1', 'W2', 'W3', 'U4', 'W5']-Unit tests checking the knowledge of problems discussed on the lectures; each about 40 questions; questions: closed type with one or more correct answers (BOFs/MCQs), true-false, matching the right answer or open-question type with a short answer

Classes-(Written test)-['W1', 'U1', 'K1', 'W2', 'U2', 'U3', 'U4', 'W5', 'W6']-written checking of knowledge in the field of problems assigned to the lab classes (short test with 5 questions; questions: closed type with one or more correct answers (BOFs/MCQs), true-false, matching the right answer or open-question type with a short answer

Literature:

1. ***Marks' Basic Medical Biochemistry: A Clinical Approach***, B) Lieberman Michael, Alisa Peet, Wolters Kluwer, 2018, Strony: 1008, Tom:1 (literatura podstawowa)

2. ***Lippincott Illustrated Reviews: Biochemistry***, A) Emine Ercikan Abali, Susan D. Cline, David S. Franklin, Susan M. Viselli, Wolters Kluwer, 2022, Strony: 625, Tom:1 (literatura

podstawowa)

3. ***Lippincott's Illustrated Reviews: Biochemistry***, Harvey Richard and Ferrier Denise, Wolters Kluwer I Lippincott Williams Wilkins, 2017, Strony: 551, Tom:1 (literatura podstawowa)

4. ***Harper's Illustrated Biochemistry***, C) Peter J. Kennelly, Kathleen M. Botham, Owen McGuinness, Victor W. Rodwell, P. Anthony Weil, McGraw-Hill, 2023, Strony: 802, Tom:1 (literatura uzupełniająca)

5. ***Medical Biochemistry at a glance***, D) Salway J.G., Wiley-Blackwell, 2012, Strony: 169, Tom:1 (literatura uzupełniająca)

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Detailed description of ECTS credits awarded - part B

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Biochemistry 2/2

The number of ECTS credits awarded consists of:

1. Contact hours with the academic teacher:

- participation in: Lecture	20 h
- participation in: Classes	40 h
- participation in: Seminar	15 h
- consultation	4 h
	Total: 79 h

2. Independent work of a student:

Preparation of reports	10.00 h
Preparation for colloquiums, written tests, and exam	40.00 h
preparation for practical classes (lab classes and seminars)	21.00 h
	Total: 71.00 h

Total (contact hours + independent work of a student): 150.00 h

1 ECTS credit = 25-30 h of an average student's work, number of ECTS,
ECTS Points = 150.00 h : 25 h/ECTS = **6.00** ECTS

Average: 6.00 ECTS

- including the number of ECTS credits for contact hours with the direct participation of an academic teacher	3.16 ECTS
- including the number of ECTS credits for hours of independent work of a student	2.84 ECTS