



48SJ-BIOCH22
ECTS: 7.00
CYCLE: 2022Z

Course syllabus - part A Biochemistry 2/2

SUBJECT MATTER CONTENT

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.

SEMINAR

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.

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.

TEACHING OBJECTIVE

During the course, the students are familiarised with molecular basics of the human body functioning in physiological 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 the 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.

Legal acts specifying learning outcomes:
672/2020

Disciplines: medical sciences

Status of the

course:Obligatoryjny

Group of courses:A -

przedmioty podstawowe

Code: ISCED 0912

Field of study:Medicine

Scope of education:

Profile of education:

General academic

Form of studies: full-time

Level of studies: uniform

master's studies

Year/semester: 2/3

Types of classes: Lecture,
Seminar, Classes

Number of hours in

semester:Lecture: 20.00,

Seminar: 15.00, Classes:

55.00

Language of instruction:

Introductory subject:

Prerequisites: The standard level of knowledge covered by the introductory subjects and chemistry (the High School level at least)

Name of the organisational unit conducting the

course:Katedra Biochemii

Person responsible for the

realization of the course:dr

Edyta Sienkiewicz-Szlapka

e-mail:

edyta.sienkiewicz@uwm.edu.p

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Additional remarks:

Protective clothing (lab coat) during the laboratory classes is required.

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_KR+++ , M/NMA_P7S_WG+++ ,
M/NMA_P7S_UW+++ , M/NM+++ ,
M/NMA_P7S_KO+++

Symbols for outcomes related to the field of study:

M/NM_B.W10.++ , M/NM_B.W15.+++ , B.U9.+ ,
M/NM_B.W13.++ , M/NM_C.W48.+ , B.U6.++ ,
M/NM_K.9.+ , C.U20.+ , KA7_KR2+ ,
M/NM_B.W14.+ , B.U10.+ , B.U8.+ , K.5.+ ,
M/NM_K.11.+ , B.U13.+ , M/NM_B.W17.+++ ,
M/NM_K.6.+ , M/NM_B.W11.++ , D.U17.+ ,
M/NM_B.W16.+++ , M/NM_B.W12.++ , B.U11.+

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 localization in cells and organs

W4 - knows the basics of xenobiotic metabolism in the human body

W5 - explains biochemical aspects that condition human health and describes the essence of metabolic diseases; characterizes, on a metabolic level, the consequences of improper nutrition, including the consumption of too copious meals, starvation and an imbalanced diet (the high-carbonate, the high-fat and the high protein one)

Skills:

U1 - predicts the direction of metabolic changes depending on the cellular energetic state; understands the essence of energetic homeostasis of the cell and the body

U2 - understands the basics of the 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

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

Social competence:

K1 - is aware of the need to 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 favorable attitude towards promotion of pro-healthy lifestyle

TEACHING FORMS AND METHODS:

Lecture(W1;W2;W3;W4;W5;U1;U2;):Conversational lecture with the use of multimedia

Seminar(W1;W2;W3;W4;W5;U1;U2;U5;K1;K2;K4;):Presenting a speech on an assigned subject, multimedia presentation, discussion, case study, debate,

Classes(W1;U3;U4;K1;K2;K3;K4;):practical laboratory exercises

FORM AND CONDITIONS OF VERIFYING LEARNING OUTCOMES:

Seminar: Written test - 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 (W1;W2;W3;W4;W5;U1;U2;U3;U4;);

Seminar: Presentation - an oral presentation of the selected problem (with multimedia support) (W1;W2;W3;W4;W5;U1;U2;U5;K1;K2;K4;);

Seminar: Part in the discussion - being active in discussions (W1;W2;W3;W4;W5;U1;U2;U5;K1;K2;K4;);

Lecture: Written exam - 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) (W1;W2;W3;W4;W5;U1;U2;U3;U4;);

Lecture: Colloquium test - 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 (W1;W2;W3;W4;W5;U1;U2;U4;);

Classes: Written test - 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 (W1;W2;W3;W4;W5;U1;U2;U3;U4;);

Classes: Report - performing analyses and preparing laboratory report (W1;W3;U3;U4;K2;K3;);

BASIC LITERATURE:

1. Harvey Richard and Ferrier Denise, *Lippincott's Illustrated Reviews: Biochemistry*, Tom 1, Wyd. Wolters Kluwer | Lippincott Williams Wilkins, R. 2017, s. 551

2. Lieberman Michael, Marks Allan D., *Marks' Basic Medical Biochemistry: A Clinical Approach*, Tom 1, Wyd. Wolters Kluwer | Lippincott Williams Wilkins, R. 2018, 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*, Tom 1, Wyd. The McGraw-Hill Companies, R. 2018, s. 800

2. Salway J.G., *Medical Biochemistry at a glance*, Tom 1, Wyd. Wiley-Blackwell, R. 2012, s. 169

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	20.0 h
- participation in: Seminar	15.0 h
- participation in: Classes	55.0 h
- consultation	5.0
	Total: 95.0 h.

2. Independent work of a student:

Preparation of reports	10.00 h
Preparation for colloquiums, written tests, and exam	50.00 h
preparation for practical classes (lab classes and seminars)	20.00 h

Total: 80.0 h

contact hours + independent work of a student Total: 175.0 h

1 ECTS credit = 25-30 h of an average student's work, number of ECTS credit = 175.0 h : 25.0 h/ECTS = 7.00 ECTS on average: 7.0 ECTS

- including the number of ECTS credits for contact hours with the direct participation of an academic teacher: 0,00 ECTS points,

- including the number of ECTS credits for hours of independent work of a student: